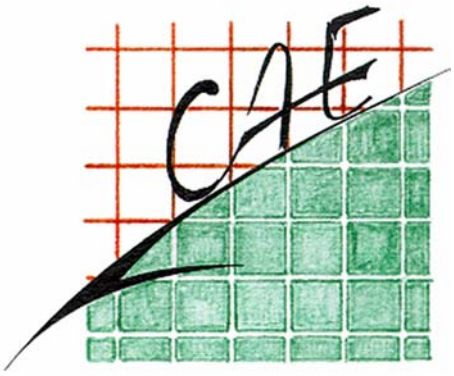

CENTRE AGRO-ENTREPRISE
Mali Sustainable Economic Growth

MALIAN MANGOES ANALYSIS OF POST HARVEST HANDLING AND PACKING SYSTEMS AND FACILITIES

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Executive Summary

World production and markets for mangoes continue to grow, and to become increasingly competitive in terms of increased customer requirements for fruit quality, and levels of customer service. These increased demands are coupled with diminishing returns to suppliers.

As a result of these changes, Mali, a long term exporter of mangoes, now faces increased, organised and sophisticated competition. To compete in the European market place, and maintain and increase exports, changes are required throughout the Malian mango industry - changes in both attitudes and in methods of exportation.

A key advantage for Mali is that Malian mangoes are recognised as having inherently good qualities in terms of fruit flavour and texture. A serious disadvantage is the lack of organisation and integration within the industry, and hence the lack of ability to plan and supply the required varieties and size of mango, correctly graded and packed, and delivered to the customer on time.

If exports of Malian mangoes are to compete successfully with other exporting countries, it is essential that all sectors of the export market fully appreciate that the service offered to importers must be perfect every time – completely faultless,

This report follows a short term visit to Mali and examination of postharvest systems and packhouse facilities. Recommendations made are intended to help increase customer confidence in Malian exports, and thus increase levels of exports. The recommendations made are for measures that are sustainable, and which can realistically be achieved during a follow up 12 week mission by the consultant, during the mango export season.

I- INTRODUCTION

The Mali Sustainable Economic Growth Project, (Mali SEG) through its office Centre Agro-Enterprise (CAE), has prioritised mangoes as one of the major economic subsectors in the country.

Over the past two years strategic attention has been focused on this sector, including a review of production and packhouse operations in the regions of Sikasso and Bamako. In addition, key Malian exporters have made visits to importers in Europe, and financial and strategic support has been given for trial commercial shipments to new markets, by air and seafreight.

The purpose of this mission was to assess packhouse facilities, collection, grading, documentation systems, inputs and other materials in detail.

Visits were made to growers and exporters in the principal grower regions, (around Sikasso and Bamako). Meetings were held with growers, plus major exporters, intermediary traders (pisteurs) shipping companies, Bamako's packaging company and the phyto-sanitary service at Bamako airport.

Recommendations are made advising how a follow up visit by a postharvest/packhouse consultant can help to ensure that export operations are managed and improved, in order to ensure the continued success and expansion of exports of mangoes to new and existing markets.

II- BACKGROUND

When considering exportation of mangoes from Mali, it is important to examine the global supply pattern for mangoes – to identify Mali's competitors, and also to look at market requirements.

2.1 International sources of Mangoes :

Mangoes are now imported into Europe throughout the year with plentiful supplies arriving from different regions world-wide. At the start of the year, Southern Hemisphere producers are harvesting and Peru, Brazil and South Africa dominate the exports market. From March onwards a large number of exporters come into the market and competition is severe up until July/August. By September only Puerto Rico and Israel provide significant supplies, before the Southern Hemisphere producers come on stream again at the end of the year. Details of mango exporting countries world-wide – Mali's competitors – are shown in Table 1.

Table 1 : International sources of Mangoes by Season

PRIVE	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
USA/Prico					**	***	***	***	***	***	*	
Mexico					**	**	***	***	**			
Costa Rica				***	***	***	***	***				
Venezuela			**	***	***	***	**					
Peru	***	***	**									***
Brazil	***	***	**							***	***	***
C. d'Ivoire			***	***	***	***	***					
S Africa	***	***	***								***	***
India				**	***	***	***	**				
Pakistan					***	***	***	**				
Israel							***	***	***	***		

Source : COLEACP

As well as Côte d'Ivoire, Mali has other competitors in West Africa - the region is a well established provider for the European market (where the French market is easily the biggest client), and exports from Mali's competitors continue to grow.

Table 2 : West African Export Marketing Seasons

PRIVE	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Guinea				***	***	***	***					
Gambia						***	***	***				
Cote d'Ivoire			***	***	***	***	***					
Burkina Faso			***	***	***	***						
Mali			***	***	***	***						
Senegal						***	**	***				

Source : COLEACP and CAE Project

Successful exportation depends on many factors. For example, Brazilian success in Europe can be attributed to :

- production from a number of different areas giving an extended season,
- domestic consumption is high and the outgrades not suitable for export can be sold or processed locally,
- importantly, exporters have mastered the shipment of mangoes by sea-freight,
- varieties popular in Europe (Haden, Kent, Tommy Atkins) have been planted,
- the harvest season matches peak demand in Europe over the Christmas period.

Exporters from Côte d'Ivoire are increasingly reaching the Brazilian level of competence including, reportedly, the export of seafreight mangoes under controlled atmosphere, to ensure that mangoes arrive in Europe in the best possible condition, but at competitive prices.

2.2 Summary of European Market Requirements :

a) General

The European demand for mangoes is growing and seems likely to continue to do so. However, the fruit is still considered an expensive exotic, and consumers need to be assured of quality and consistent ripeness at a reasonable price. As mango production escalates world-wide, the European market is increasingly competitive, putting downward pressure on prices, (which should in turn fuel market growth).

A niche remains for air-freight mango suppliers, to provide either a premium quality product, or as an occasional opportunity when immediate supplies are not available. However the main sector of the market will require sea-freighted mangoes, and the import price will continue to move downwards.

Mangoes are brought into Europe by importers supplying different market sectors - the supermarkets, the wholesale markets, and small sectors of the ethnic market. The best volumes and prices are obtained from the supermarkets, and importers handling this trade, preferably with good contacts across Europe, should be the focus of the exporter's attention. However, initially, it is unlikely that product (and handling systems) will meet the requirements of this demanding sector. It is therefore important to work with an importer who is able to place fruits on the wholesale markets, and into the catering and ethnic sectors. All sectors will have specific and probably different requirements in terms of varieties or sizes, and this must be clearly recognised by the exporter.

Generally, European consumers continue to have a poor understanding of the fruit, the relative merits of one variety over another, and how to assess ripeness. Decisions are made on visual aspects and hence the preference, particularly in the UK and Germany, for attractively coloured Florida types such as Tommy Atkins.

It is critical to provide a ripe, good-looking mango to the consumer. More expensive airfreight fruit should be closer to ripeness when harvested. Skills must be developed in timing the harvest to provide a fruit that will arrive in prime condition. The ability to grade and properly prepare the product determines success. Fruit destined for seafreight will need to be harvested at an earlier stage, to ensure it survives a longer delivery time, but still arrives in prime condition, to be ripened by the importer if necessary.

b) By country

Requirements, for varieties and fruit sizes, vary considerably between different countries, and different buyers within the same country.

In France, less attention is applied to visual appearance, and eating qualities such as taste and texture are given more importance. The Amelie variety has gained a market share here, and the green types are generally appreciated, for example even if poorly coloured, Keitt and Kent are better appreciated in France than in the UK.

In Germany, visual appeal competes with price in importance to the consumer. Size is therefore of importance, and the market seems to prefer larger fruits. In this market Keitt and Haden are well known.

In the UK, the most popular types are the Florida varieties, particularly those colouring with a pink flush, such as Tommy Atkins, Haden or Kent. These are the preferred types of the supermarkets, largely serving the indigenous population. Among the Asian population, the Indian types such as Alphonso are preferred, but there is an increasing demand for the Florida types, which survive transportation well.

The demands of UK multiples are extremely tough. From the field to the supermarket shelf the UK multiples require hygiene, handling and quality standards more applicable to a food factory than to farm packhouses. Quality is usually rewarded with a premium.

All agro-chemicals used in pre and post harvest treatments should meet with the legislation required in the country of origin and in the country to which the fruit is exported.

The EU has a Quality Standard for Mangoes enforced on importers by law. In addition, generally, each importer has his own standards/ requirements. Quality issues are discussed in detail in Section 7.0 of this report.

Whatever quality requested by an importer, an exporter with a reputation for reliability will encourage repeat business to the exclusion of competitors.

III– CURRENT SUPPLY SITUATION IN MALI

3.1 Overview :

The marketing chain in Mali is comprised of growers/producers, fruit collectors (pisteurs) and exporters. The principal grower regions are around Sikasso and Bamako.

a) *Growers*

Mango producers vary considerably in the size of their farms, from 0.5ha, to growers with 50 plus hectares.

However, almost without exception and regardless of farm size, growers have no regular, reliable sales outlets for their products. Instead they rely on the collectors (pisteurs), - traders who arrive at harvest time (March to June) to buy the fruit.
Because farmers have no assured market for their products, they do not invest a great deal of money in production. None of the growers met took any steps to control pests and diseases[1], none used fertiliser.

The overwhelming majority of mangoes are of local varieties, with no export potential. The better growers had grafted newer, export varieties onto local rootstocks. Varieties used include Kent and Keitt – although the latter is not always well coloured. Varieties are mixed in orchards.

Better growers do carry out some cultivation, including clearing grass from under trees (the grass is a fire hazard), clearing away fallen fruit at the end of the season, and pruning trees to ensure that fruit is held at least 1m above soil level.

[1]Some growers showed a surprising lack of knowledge about the causes of pest and disease problems.

The major pest problem is mango fruit fly. CAE investigations indicate that around 50% of Kent and Keitt fruit are spoiled by fruit fly infestation, and up to 90% of the Brookes variety is spoiled. Fruit infested with fly is clearly not suitable for export. Fungal diseases were not reported as a problem, except for anthracnose which can develop on fruit harvested towards the end of the season, as the rainy season commences.

b) Collectors (Pisteurs)

The pisteurs harvest fruit at the farm, pay the farmers and transport the fruit to markets/exporters in the towns. There are two major types of pisteurs, the first arrive and harvest all fruit of export quality. They may visit an orchard two or three times. The second type of pisteurs collect lower value, local market quality product. These pisteurs are not allowed to collect fruit until all the export quality fruit in an orchard has been harvested.

Each pisteur buys from approximately 40/50 growers each season, preferring to buy from one grower per day, but frequently buying from several.

The pisteurs have to fund the buying of product from farmers themselves, paying the grower on the day of harvest, before removing the fruit from the farm. In addition, the pisteur has to pay experienced labourers to harvest the crop, and also fund the cost of hiring transport. Pickups with a capacity of 900kg are used for Malian exporters/ markets; 10t trucks are used if product is to be delivered to Côte d'Ivoire exporters.

Pisteurs supply Malian and Côte d'Ivoire exporters and markets. They compete with traders from the Côte d'Ivoire who buy from farms, particularly in the area around Sikasso.

c) Exporters

Most of the mango exporters from Mali are small business men who operate more than one business.

With one exception, exporters do not work directly with producers. They buy from traders (pisteurs), buying from several pisteurs each day, and up to 30 pisteurs each season.

The exporters employ (retain) a small core of packhouse staff throughout the year, and recruit other packhouse staff on a daily basis, as needed during the export season.

They have to fund the purchase of mangoes on the day of delivery. In addition, they pay in advance for packaging, and pay daily labourers to grade and pack product (up to 50 labourers per day), plus transportation to the airport at Bamako, or (rarely) the port of Abidjan. Freight charges may be paid by importers. There are no credit facilities available for exporters, and financial shortages are a serious constraint. Volumes exported per exporter are therefore small.

d) Growing Régions

The principal growers regions are :

Sikasso : The mangoes from here are generally seafreighted. Product is taken to Côte d'Ivoire exporters, and there have been some seafreight trials by Malian exporters.

Bamako : Mangoes from the area around Bamako are generally airfreight to Europe.

3.2 Constraints of the Industry :

The constraints upon the Malian export industry are well known :

The different sectors of the industry – growing, harvesting and exporting are not integrated. Growers, harvesters/collectors (pisteurs) and exporters are all different groups of people.

Those working in the different sectors – growers, collectors and exporters – do not have strong working relationships or mutual trust within the sectors, or between the sectors. This leads to difficulties such as :

- Growers will not reserve production for a buyer unless a substantial deposit is paid in advance, eg 100,000CFA per ha. If buyers reserve fruit without payment, and subsequently do not collect and buy the fruit, the grower may lose his sale completely, or the mangoes may have to be sold on the local market at a lower price.

- Buyers (collectors/exporters) will not pay in advance, because they do not trust growers to fully reserve crops or maintain them well and, if a natural catastrophe occurs after payment of an advance, the buyer risks losing his financial investment.

  As previous stated, growers do not invest substantially in production, because they cannot be sure of selling their mangoes. As a result :

- Production is poor with many fruits not of exportable quality (due primarily to infestation by fruit fly).

- Production of mangoes has not been organised for export. Although, exportable varieties are grown, these are in the minority and are frequently mixed in orchards with non exportable varieties, making harvest of export qualities complicated.

- Mangoes are frequently harvested from tiny orchards, leading to produce from up to 30 growers being exported in the same (relatively small) consignment.

- Collection of fruits from so many different sources, by many different harvesting teams (each with different systems and harvest/delivery times) leads to a lack of uniformity amongst the harvested fruit, in terms of shelf life, speed of ripening, etc.

The pisteurs (collectors) are simply traders ; they have no particular loyalty to growers, or exporters, and no vested interest in delivering truly top class mangoes, or indeed the variety/size required (and requested) by the exporters.

Malian exporters do not have the same level of finance available as large exporters in other countries.

There are no credit facilities available for exporters (or collectors and growers), but all product and packaging material has to be paid for at the time of purchase or in advance.

Exporters, and others in the industry, do not have a good grasp or understanding of the intensely competitive nature of European imports for mangoes (and indeed other crops). They are not yet orientated toward providing the level of service required by importers.

For example, UK importers complain that the varieties of mango and sizes they order are not supplied. Instead, without any discussion or warning, Malian exporters supply whatever products they have. This results in importers having :

- client orders they cannot meet.
- varieties and sizes of mangoes for which there is no market.

Another importer has complained that he requires fully ripe fruit to withstand cold UK ambient temperatures (he does not have temperature controlled storage). Despite repeated requests, he still receives fruit which is backward/under-ripe, and which is subsequently damaged and devalued by cold ambient temperatures.

Although highly coloured fruit is required by the market, it is not always supplied by exporters.

Some problems have been experienced with mixed degrees of ripeness in boxes, the result of poor handling or grading systems.
Other constraints for the local mango industry include the fact that Mali is landlocked. It has good access to the Port of Abidjan, but the journey from Bamako can take a container up to two days to complete.

In addition, the local packaging industry is not well developed – boxes are available, but not pallet corners, plastic strapping, or tissue paper (which has been requested by one French importer).

3.3 Advantages for the Malian Industry :

Despite its many constraints, the Malian mango industry does have some very strong marketing advantages :

- The inherently good eating qualities of the mangoes grown in Mali – good flavour and fruit texture – have been appreciated for many years, and continue to be well appreciated in Europe.
- None of the UK importers have complained that individual fruit quality is poor. Indeed many say that fruit are visually good, as well as good to eat. (Problems have arisen when incorrect varieties/qualities/ sizes are exported).
- There are huge areas of mangoes grown in Mali. Much of this area is of the varieties required for export, and has the coloration required by importers.
- Growers and agronomists are experienced in grafting export varieties onto existing rootstocks. The grafting of export varieties onto mature trees (rootstocks) is reported to result in harvests of export variety fruit within two years.
- The lack of use of pesticides by growers is a distinct advantage when exporting to Europe. Residues of pesticides are greatly feared by European importers and consumers alike.
- The dry climate during harvest is reported to minimise the incidence of fungal disease.
- Exporters are committed to exporting mangoes and increasing levels of exports.

- Exports from neighbouring countries, particularly from Côte d'Ivoire, prove what can be achieved in the region.
- It is possible to export by sea via Abidjan. Refrigerated containers are available in Mali (Bamako and Sikasso). Controlled atmosphere containers could be provided, giving a longer product life for exported mangoes.
- Air freight charges are relatively low compared to other mango exporting countries, and freight space appears to be widely available.

3.4 Principle Exporters :

M Jacque Tapon French owner of the packhouse at Sikasso, which has been reclaimed by the bank. Mr Tapon is currently in France and was not met by the consultant.

M D. Latapie Director/owner of InterAgro at Sikasso, but not expected to be exporting in 2001.

Mme Touré President and supporter of AMELEF. Mme Touré has exported in the past through her company Multichem. She is not exporting currently, because of excessive difficulty.

M Ibrahima Coulibaly Exporter in his own right, and member of the co-operative Mali Yiriden.

M. Kone Company Fruitiere de Lotio

Amadou Niane Company Fruitex. Mr Niane is Secretary General of AMELEF, and a member of the Malian team that visited importers in the UK, France, Holland and Germany.

M Makanguile Company Deguessi Vert. Mr Makinguile was a member of the Malian team who visited importers in the UK, France, Holland and Germany.

M Malinke (& Son) Company Flex Mali. They have exported to an Importer in Rungis Market (Paris) for 15 years. M. Malinke Jnr is the Managing Director of the company. M Malinke Snr is the President of the exporters association APEFEL.

Table 3 below shows Malian exports by Exporter in the 2000 season.

Table 3 : Exports from Mali in the 2000 Season kg (by exporter)

Exporter	By Air	By Sea	Total
Flex Mali	233685	18000	251685
Ets Yaffa & Freres	98283		98283
Mali Primeurs	78412		78412
Fruitex	72734		72734
Soleil Vert	66259		66259
Primeurs Expansion	63993		63993
Tam Fruits	42310		42310
IB Negoce	31320		31320
Diaby Doucoure	26779		26779
AOM	18323		18323
Exofruits	11772		11772
Somalfeg	10731		10731
Continental	8778		8778
Moussa Sanogo	7842		7842
Comafruits	5935		5935
Deita Distribution	5330		5330
Deguessi SA	3650		3650
M.L.H	1375		1375
Pool Sikasso		248000	248000

Source : CAE Project

Note : Statistics do not include the months of July and August ; export levels, however, are not significant during those months. Official statistics may significantly underestimate export figures for Yaffa & Frères.

3.5 Other Contacts :

Mali Yiridan Based in Sikasso, Mali Yiridan is an association of 12 members who support the industry – exporters and pisteurs. The 12 members have different functions, eg. research on production (2/3 people), organisation of transportation, sourcing/supplying packaging, selling products (not exporting, generally.

Manzon Keita Chief of Poste de Controle Phyto-Sanitaire.

Mr Fatogoma Sanogo Entomologist at IER, Sikasso, highly recommended by Jean Francois. (CIRAD consultant entomologist).

Details of meetings held with key members of the mango export industry are given in Appendix 3.

3.6 Recommendations re Exportation :

Currently, Malian exporters have a bad reputation in the UK for supplying incorrect varieties and sizes of mangoes. In France one importer regularly receives product which has to be re-graded and repacked.

The lack of a strongly service-orientated exporting sector will hinder the development of mango exports, and should be addressed.

It is therefore recommended that the packhouse consultant should organise two types of training in country, on the subject of customer service:

a. a poster publicity campaign targeted at all in the handling chain, and
b. a training programme, providing specific training courses for packhouse management staff.

a. Poster Campaign :

The power of a strongly worded publicity campaign cannot be underestimated. For example, the Dutch horticultural reputation for uniformity of product, and careful postharvest handling was largely the result of a sustained publicity poster campaign, targeted at growers and their staff.

It is recommended that relatively large numbers (say 150-200 in total) of laminated illustrated, information posters (A3/A4) are produced within the project. These should be distributed to exporters, packhouse management and staff, to encourage them to achieve higher levels of product handling and customer service. Further distribution of posters to pisteurs and growers should be supported.

Messages should be simple, (and where appropriate amusing). They should be written in French and Bamana, and generally carry only one message per poster. Ideally these should be produced in a graphic form (with few words), adapted to the local culture/style of publicity.

Posters should give new information, but also strongly re-inforce information already known to all sectors. It is recommended that posters conveying the following messages are produced:

- Mangoes which have been dropped at any stage will not survive transport to Europe and should not be exported, but sold on the local market.
- Exporting damaged mangoes damages the reputation of Malian mangoes.
- Each client in each country, has different, individual requirements and must be treated as an individual.
- Supplying importers with exactly the variety, quality, size and quantity of mangoes they require is vital, or clients are lost forever.
- Details of common quality standards (see section 7 below) could be posted at packing stations for everyone's information (pisteurs and growers, as well as exporters and staff).
- Repacking of product in Europe costs Malian exporters 5000CFA per person per hour (a poster of this type may have limited distribution, but should capture the attention of exporters themselves).
- Malian exporters are stronger if they work together as one industry, each exporter with his own clients.

- Distribution of posters displaying identifying characteristics of the main export varieties could help improve/reinforce accurate sourcing, packing and labeling of export varieties.

b. Training Programmes/Seminars :

It is further advised that a training meeting should be held with exporters to discuss :

- The implications of European regulations on exporting countries. Particular emphasis should be made of the fact that importers in Europe are increasingly abiding by EUREP–guidelines on food safety, environmental safety, work practices and social standards.
- Those parties who ignore the new requirement of the markets or fail to respond to the new higher standards will inevitably find themselves disqualified from supplying the major retailers – who buy in volume, and generally give the best returns.
- The winners amongst exporters will be those parties who can demonstrate that they exercise due diligence over the production process, and employ work practices that meet or exceed the minimum food safety, health, environmental and social standards required by European legislation and consumers alike.
- It should also be noted that the development of new risk management systems, which allow a more direct or traceable relationship between retailers and producers, could threaten the role of the traditional intermediaries (the pisteurs).

In order that they can be helped to understand the requirements of the market, it would be advisable to include the most respected pisteurs to the same meeting, (eg. the President of the Association of Pisteurs in Sikasso; and those serious pisteurs recommended by exporters). The intention would be to encourage pisteurs to work with exporters in meeting requirements of traceability etc.

3.7 Seafreight trials :

In order for Mali to compete effectively with mango exports from the Côte d'Ivoire, it will be necessary for Malian exporters to seafreight product to Europe. Trials should be carried out to perfect post harvest handling and export organisation.

Ideally, trials should be carried out from the region around Sikasso – an area where those in the mango industry are used to collecting and handling mangoes for export by sea.

However, in order to export by seafreight it is essential that precooling and cold storage of mangoes takes place, prior to loading into a container.

At the time of writing it is not clear whether there will be any cold storage facilities available in the Sikasso region.

3.8 Recommendations re Seafreight trials :

The following recommendations are provisional on cold storage being available :

a. If coldstores become available in the area, export trials by seafreight from Sikasso should be supervised by the consultant. The work should be carried out with the

Co-operative Mali Yiriden, and exporters known to the project who are willing to work in that region.

b. Maersk shipping lines should be used to transport the product.

c. Although Maersk can provide controlled atmosphere containers, it is not advised that these are used for initial consignments.

d. If coldstores do not become available in Sikasso, pooled seafreight trials could be carried out from Bamako. This will involve consultant training of harvesting, grading and packing staff, in the requirement for seafreight quality mangoes, as opposed to the airfreight mangoes they are well used to exporting.

e. If it is not possible to arrange seafreight trials from Sikasso, and seafreight trials are envisaged from Bamako, it may be advisable to first arrange pooled charter of freight planes[2].

This would give Bamako exporters the opportunity to become accustomed to supplying the correct quantity of mangoes together as a pool, at the required time. Freight could be held in coldstores at the airport for a short period (say 10-15 hours) to allow for consolidation.
A charter airfreight trial such as this has the advantage that one learning curve – selection of fruit for maritime export by the Bamako sector - need not apply.
However the financial risks are extremely high ; it should only be attempted if there is full confidence in the growers' ability to supply product, if the growers are fully committed to exporting en masse, financially committed as well as verbally, and if there are significant financial benefits from reduced freight charges, compared with normal cargo charges.

IV- POST HARVEST HANDLING

4.1 Post harvest handling in Mali :

It is difficult to make precise recommendations regarding the post harvest handling of mangoes based on the consultant's tour of the industry. This is primarily because no harvesting took place at the time of the visit, and it would be unjust to comment.

However, it is reported that handling systems in packhouses are extremely poor, with fruit being thrown, dropped and subjected to general poor handling. Core packhouse staff are retained throughout the year, but general staff are recruited on a daily need basis, throughout the mango exporting season. Even those stations recruiting 60 packhouse staff per day, recruit on a daily basis.

A general description of post harvest handling in packhouses was obtained from exporters. Mangoes are generally hand-washed in plastic bowls of water, brushed and dried. Grading is then carried out by hand or grading machines, and fruit packed into boxes by hand.

[2] It is understood that freight charter is relatively simple to arrange from Bamako to Europe at short notice, although this is not the author's experience of air cargo chartering in other parts of the produce exporting world.

It has been noted that cold storage is absent from almost all exporters now operating, and whilst this reduces costs considerably, it will hinder the development of uniform quality mangoes from Mali.

4.2 Recommendations for post harvest handing in Mali :

It is recommended that the packhouse consultant :

- Organises a series of training days for core packhouse staff on the subject of post harvest handling and packing of mangoes.
- Supervises on site handling, grading and packing training of daily recruited staff, for at least one day at each packing station.
- Produces a simple mango handling guide to be funded by the project, and handed to each packhouse worker to read. The worker should be made to take the guide seriously, signing that the guide has been examined and understood. Literacy problems amongst workers may mean that the guide is simply an illustrated guide.
- Packhouse management should be encouraged to keep a record of staff training, and should themselves train new members of staff.

4.3 Post harvest systems used in other exporting countries :

The following information is included in this report for reference purposes only.

a. General :

Mango is a climacteric fruit, which means that it continues to ripen after picking. The ripening process is rapid, and a fully ripe fruit has only a short shelf life. Although immature fruits keep longer, fruit harvested before reaching maturity will shrivel during storage and will not be saleable.

The correct stage of ripeness for picking will depend upon the method of transport, and the requirements of the importer. Air-freighted mangoes should be fully mature, but still green or partially coloured. Fruits for sea-freighting should be less mature but with a well developed shoulder.

Fruit should not be harvested more than 36 hours before shipment, and less than 24 hours if cold storage is not available.

b. Degree of Ripeness :

The correct stage of ripeness for harvesting is difficult to determine, but can be recognised using a number of features. None of the features can be applied universally - the features are different for each variety, and the characteristics of the mango cultivar must be known. The principal methods of determination include :

- Brix Value. This is established with a refractometer to get the potential value of total soluble solids, which is used as a measure of the sugar content and therefore of the sweetness of the fruit. The Brix value should be between 8-10%, 10% for fruit to be stored over a short period of time, and 8-9% for fruit that is to be stored longer.

- A mango that has reached the full development stage will have a "shoulder" and not be ovoid in shape. This is a particularly useful indicator.
- A slight depression around the stem with outgrown shoulders is the fully mature shape.
- Skin Colour. Harvest only those fruits where the basic colour, usually green, has lightened. Colour break in the Florida types is a good indicator.
- Flesh Colour and Firmness. The flesh should be turning yellow particularly around the stone.
- Specific Gravity, can give an indication of ripeness as follows :
  - Ripe fruit, only suited for short term storage will have a S.G. of 1.02-1.04.
  - Fully developed fruit, but still green will have a S.G. of 1.00-1.02.
    Without the use of instruments, a float test in a water bath can be used to determine the fruit ripeness :
  - Fruits that float just below the surface or slowly sink to the bottom are suited for long storage.
  - Immature mangoes will float.

  Some mango varieties especially those grown in arid areas have a higher specific gravity, and even immature mangoes will sink. Based on experience in the area, the "floatability" of the fruit can be increased by using salty water (1kg of salt in 100 litres of water).

c. Picking :

The harvest should be carried out during the cool of the day, with clean field crates stored under shade to avoid the heat of the sun.

Mangoes are delicate fruits with a high density and are poorly protected by a comparatively thin flexible skin. The fruit is therefore very sensitive to bruising, blemishes and cuts.

To minimise damage to the fruit, it is recommended that they should be picked very carefully, using a sharp knife or secateurs to cut the stem at least 4cm from the fruit. Fruit which falls to the ground, should not be sent for export as the bruising will quickly deteriorate, and the fruit will be unsaleable by the time it reaches the retailer. Immature, damaged or diseased fruits should be separated in the field from the export produce.

Poor handling will cause skin wounds, and allow moulds (*Penicillium*, *Rhizopus*, *Aspergillus* etc) to colonise the fruit. Sharp edges in field crates should be avoided, and padding considered to provide further protection.

Crates of mangoes should be removed from the field to the packing station as soon as possible. If full crates are left in the field to await collection, they should be covered and kept in the shade.

d. Prevention of Latex Flow :

As well as physical damage, the mango skin can be stained by the latex that exudes from the freshly cut fruit stalk.

When cutting the fruit from the tree it is important to leave a long fruit stalk greater than 4cm. The fruit must be placed upright in harvesting containers to avoid latex dripping onto the flesh.

Once the fruit stalk has sealed, it can be cut back further leaving 2-3cm. Some Importers now accept fruit stalks within the fruit specification since, once mature, they drop off naturally.

Any latex that does drip onto the fruit skin must be immediately washed off with water. Pickers must be aware that mango latex is caustic and can cause eye injury, and in some people, the skin may blister.

Immature mangoes produce more latex than mature fruits when cut from the tree.

e. Post-Harvest Treatments :

From the field onwards it is important to keep handling to a minimum. The development of non-chemical techniques to maintain post-harvest quality is important, particularly as a number of fumigants are now banned.

If a water bath is to be used to wash off latex stains, it is important either to include an approved fungicide in the water, or at the very least to change the water frequently. If this is not done, diseased fruits may infect others.

f. Hot Water Treatment :

If anthracnose is a problem, mangoes for export can be treated in hot water immediately after picking.

Mangoes are submerged in hot water at 55^{o}C for a period of 5 minutes. Some mangoes have delicate skin that will need a reduced temperature e.g. for Tommy Atkins use a maximum temperature of 52^{o}C soaking for 10 minutes.

The effectiveness of treatment can be enhanced by adding approved fungicides. Details of permitted fungicides should be discussed with the importer, in order to ensure that no pesticide bans in the importing country are infringed. It is not uncommon to use a wetting agent to prevent fungicide spotting of the fruit, again this agent should be discussed with the importer.

After hot water treatment, the mangoes need to be cooled down gradually to the ambient temperature, perhaps using fans, which will also dry the fruit. The mangoes must not be put in cold storage immediately; fruits cooled off too rapidly may be more susceptible to fungal attack and the skin will not colour uniformly on ripening.

g. Grading :

Finally, before packing the fruits should be carefully graded to ensure that only the highest quality fruits are exported. Poor quality fruits will not repay their freight costs, and mixed quality boxes will be priced on the poorest quality. The inclusion of a diseased or damaged

fruit may affect other fruits in the carton (eg transfer of disease, production of the ripening gas ethylene), and damages the reputation of the exporter.

Only one variety should be packed into a box.

In addition to meeting European Union quality standards for mangoes, specific quality requirements must be agreed with the importer. The exporter must ensure that all the produce within a carton matches the importer's specification, and is uniform in terms of quality, size and degree of ripeness. It is important to note that sorting in the destination country can be ten times more expensive than at origin, and the exporter pays for this additional sorting (eg by receiving reduced prices).

h. Storage & Transport :

It is essential to avoid mixed storage of products. For example storage with onions may result in a transfer of odours between products. If mangoes are stored together with ethylene producing fruits e.g. pineapples or tomatoes, the additional ethylene in store will stimulate the ripening process of all products and decrease shelf-life. Concentrations as low as 0.2ppm of ethylene are sufficient to speed up ripening of mangoes.

In order to prevent ethylene build up, the store's atmosphere must be replaced at least every five days.

i. Pre-cooling :

Until recently, mangoes intended for export by air were not pre-cooled, but with increasing emphasis on a longer shelf-life in supermarkets, all mangoes for export ought to be pre-cooled. In the case of Mali, where ambient temperatures can be 40°C, it is recommended that cooling takes place prior to despatch. In the case of delay in airfreight, it will be essential to coldstore mangoes.

For mangoes to be exported by sea pre-cooling is essential : refrigerated containers do not have sufficient capacity to remove field heat quickly.

Holding mangoes at low temperatures, slows down the metabolic process in the fruit, which not only delays the ripening process but also reduces weight loss. At 10-12^{0}C, mangoes have a marketable life of 15 - 22 days, depending on harvest maturity and variety.

Below 10^{0}C, mangoes are susceptible to chilling injury, which is recognised by the following :

- the skin colour becomes dull and grey,
- the skin becomes pitted and "scalded",
- the consignment ripens unevenly,
- high acidity/low sugar content.

Mangoes that have been properly packed for export should be transferred to a dedicated pre-cooling facility, or at least to a refrigerated room equipped with auxiliary fans to produce forced air for rapid cooling. The box design must have sufficient air holes to allow efficient and effective circulation.

j. Cold Storage :

In practice storage temperatures may be adjusted according to variety, eg.:

Variety	Temperature ^{o}C	N^{o} of Weeks
Zill	10 - 11	2 - 3
Irwin	10 - 11	2 - 3
Julie	10 - 11	2 - 3
Haden	12 - 14	2 - 3
Kent	12 - 14	2 - 3
Keitt	12 - 14	2 - 3
Tommy Atkins	12 - 14	2 - 3

* The relative humidity in the cold store should be around 90%.
* Riper fruit can be cooled at lower temperature but will not keep for so long.
* Fruits are ready for eating two to three days after returning to ambient temperatures.

k. Transport :

Owing to the advances in container technology, transport of mangoes by sea has grown considerably. In comparison to air-freight, sea-freight can transport greater volumes of product at a lower cost.

To sea-freight mangoes the cold chain must be in place from farm to ship. The logistics are :

- Precooling directly after hot water treatment/washing and packaging,
- Cold storage,
- Refrigerated transport to the port,
- Load into port cold storage facilities or directly onto the boat.

Nevertheless conventional cold storage/reefer containers are generally only suitable for transporting mangoes for a maximum duration of 10 days, in order to ensure that the mangoes have adequate storage/shelf life remaining, when they arrive in the destination/importing country.

Although it is more expensive than surface transport, air transport is significantly simpler, as fruits can be harvested later and post-harvest problems are less likely to develop between farm gate and consumer. Boxes should be palletised rather than placed in containers, because the respiration of fruits within an enclosed container can lead to high temperatures and a build up of ethylene.

l. Controlled Atmosphere Storage :

The post-harvest life of mangoes can be significantly extended by controlled atmosphere (CA) storage. It has been suggested that mangoes can be kept in store for up to four weeks using this technology.

A “controlled atmosphere” is achieved by maintaining a pre-determined composition of the air within a sealed storage unit, as compared to normal atmosphere. Oxygen levels are

allowed to decrease under normal respiration, and are then maintained at low levels while CO_2 levels are held above normal.

Controlled Atmosphere (CA) containers are now in use for the transport of mangoes. Transfresh, is one of the major suppliers of CA technology and hardware known as Tectrol CA. In Africa the system is available in such ports as Dakar, Senegal and Cape Town, South Africa.

Only mangoes that are still in the pre-climacteric stage should be shipped in CA containers. That is to say fruit that has reached maturity, but has not yet begun the ripening process. For mangoes, the temperature should be held at 12.5°C and CO_2 levels kept at 2-5% with O_2 at 3%. Ethylene should be removed using a scrubber.

Incorrectly carried out, higher concentrations of CO_2 may, depending on the variety, cause skin injury and the fermentation of aldehyde and alcohol may become a problem.

CA can prove difficult for the following reasons :

- CA containers are not universally available, and in some countries need to be shipped out to the exporter incurring extra costs.
- Gases for the system may not be available in the exporter country.
- The longer the mangoes are transported, the more time the producer/exporter waits for payment.

V- PACKHOUSES

5.1 Packhouses in Mali :

As with the post harvest handling systems, it is extremely difficult to make precise recommendations regarding packhouse operations based on this visit. This is because the packhouses were not operational at the time of the visit and it would be unjust to comment.

However the following observations were made :

- Sites were generally open, with canopies to shade workers and mangoes,
- There was one good, large purpose built packhouse in Sikasso, previously owned by AOM. Details below.
- Individual exporters' packhouse facilities are generally limited. Only one of the exporters expected to export mangoes in 2001 had cold stores (Mali Primeur).
- Sites need cleaning. Whilst it is clear that the packhouses were not in use during the visit and would naturally be cleaned prior to commencement of exports, some sites were contaminated with vehicle oil. The presence of vehicle oil in a food area should be avoided at all costs. (It is difficult to remove, and is a well known carcinogen ; any cross contamination onto food could have serious repercussions for exporters).
- In some packhouse, conditioning equipment was left open to the air (uncovered) during the closed season.
- Brushes and rollers on some equipment were worn and needed to be replaced (worn brushes can damage fruit).

- Packing stations were generally small, suggesting difficulties might be encountered, when trying to organise production lines.
- Some packhouses were in residential areas, giving little opportunity for installing large, noisy coldstores.
- Some packhouses had soil based floors, and no pallet moving equipment was visible, suggesting all boxes are moved by hand.

Table 4 : Summary of packhouses visited.

Company/owner	Description
Packhouse at Sikasso. Previously owned by AOM, the packhouse is now the subject of discussions between the Bank of Africa and AOM. It's future is unclear**.**	- The station was purpose built, and is relatively new. - The packhouse building is large (very approximately, 2500m2) with additional packaging stores (mezzanine level) and very adequate coldstore. - The station has a reputed capacity of 60 tonnes per day, although only 20 tonnes/day were actually packed - Israeli conditioning equipment has been installed, with a product elevator from the reception bin, an examination line, brushing and drying lines, and finally grading by weight cups into padded bins, prior to packing. - There is a right angle in the conditioning equipment layout, but otherwise a well designed one way flow of product. - A working demonstration was not seen - The precooler and coldstores appear to have large capacities, (rooms were large, but details of cooling capacity were not available). In terms of space they could easily hold 60 tons of product, and probably considerably more. - The station has several offices. - Lorry loading docks are raised. - The site needs significant amounts of cleaning. - It is doubtful that there is sufficient artificial light; natural daylight is allowed into the station to help work during daylight hours. - This could cause a problem, especially for night time production, when inadequate lights will mean poor grading, but will attract insects since there are no nets over openings. - The site is very large, with adequate parking - There are few resources available for packhouse staff (toilet blocks not visited, no restroom or locker room).
Fruitex	A small site with no buildings. The site has two grading lines and canopies covering each, plus an additional canopy to provide shade for storage of mangoes.
Ets Bakary Yaffa & Freres	This was a good site, although packing facilities were limited. The site is relatively large, and close to a good tarmac road to Bamako airport and Sikasso. In addition, it is close to sites of production around Bamako. There is a three storey building on the site. One, ground floor room is used to store boxes, and occasionally fruit. All conditioning takes place under a thatched canopy in the grounds. Washing, grading and packing is done by hand, with no grading equipment used.

Maliprimeur	Other than the AOM site, this was the only packing station seen that had coldstores. The site is approximately 70' x 30', an open area between two buildings. A canopy is placed over the grading area when it is in use. Product is hand washed in plastic buckets. Maliprimeur have a circular grading machine (a Tourangelle). The site has one 8t cold store, and one 1t coldstore. These are positioned in the furthest corner from the loading area. Adjoining offices are used for packaging stores. Maliprimeur has a refrigerated 8t lorry.

5.2 Packhouse Design (general) :

The following information is given for general information purposes. It should be considered when planning a new packhouse, or altering an existing packhouse. The guidelines apply equally to very small and very large packhouses.

a. Site :

The site should :

- be situated in an area with good access to areas of production and metalled roads for transport to airports/ seaports.
- have good access to water and electricity supplies
- be large enough for the reversing/turning circles of the largest vehicles, including where relevant 40' containers.
- have an external site which is completely level (or have only the slighted gradient for drainage purposes).
- have a completely level packhouse floor[3] ; there should be no steps and no slopes into, or within, the packhouse/packaging areas/coldstores.
- have adequate drainage system internally and externally, to allow water to be drained away as necessary.

b. Packhouse Layout :

A relatively simple packhouse design should include :

- Goods arrival area.
- Goods packing area.
- Pre-cooler and cold storage areas.
- Packaging stores with entrances to the packhouse and with their own external entrances.
- Locker rooms, toilets and separate, dedicated handwash area for staff entering the packhouse.
- Office areas adjoining the packhouse, but with their own external entrance.

[3] The only exception to the level site may be an exit with a sunken loading bay. If outloading to smaller vehicles is anticipated, an exit from the packhouse to a level site should also be provided.

- A storage room, with water source, for cleaning materials.

Product should 'flow' along a 'one way' system. That is, it should pass from one process to another in a smooth, continuous line, without passing across other processes in the packhouse (e.g. box making).

It is particularly important that after it is graded or packed, product does not re-enter 'dirty areas' – eg goods reception/cleaning/washing areas, where contamination with water, or soil from field boxes may damage the appearance of the product/final packaging.

Further information on the construction of a packhouse is given in Appendix 4.

VI- QUALITY ISSUES

6.1 General :

For the importer, reliability in delivery, quantity and quality are the most important factors in choosing between different suppliers. If a good, working relationship can be established with a reliable exporter, established importers provide technical and marketing assistance.

It is therefore essential for an exporter to work towards long-term relationships with an importer, establishing a reputation for reliability, by being quality conscious, (quality of produce and service), and by communicating efficiently and being attentive to client demands.

6.2 Fruit Quality Standards :

A classification, packing and labelling standard has been adopted by the EU, but the importers' requirements, which will be at least as rigorous, are far more important and should be sought in advance.

The EU has a common Quality Control standard for mangoes. It includes the following requirements :

Fruit should be :

- whole, intact and firm,
- sound ; rotting deteriorating produce which is unfit for consumption must be excluded,
- clean and practically free of foreign matter,
- free of marked bruising,
- free of pests and damage caused by insects and/or other parasites,
- free of damage caused by low temperatures,
- free of abnormal external moisture,
- free of foreign taste or smell,
- sufficiently mature for the ripening process to be completed,
- the contents of each package should be uniform in terms of origin, variety, quality and size.

The Standard also sets out detailed requirements to meet different quality standards, Class I, Class II etc., together with packaging requirements.

Full details of the standard can be found at the CAE office in Bamako.

6.3 Recommendations to address quality issues in Mali :

a. Quality Standards :

In order to enable exporters, pisteurs and growers to work together, each must have the same, clear idea of a common standard.

It is strongly recommended that Malian exporters work together with the packhouse consultant, and agree a common standard for all to work by. At its simplest, this could the EU standard (already circulated to some exporters), but it needs to be discussed and agreed amongst exporters.

b. Quality Assurance :

The adoption of good quality assurance systems is key to improving the quality of produce and service provided to customers.

It is recommended that the packhouse consultant should work with each individual exporter, and develop and implement quality control systems for exportation of mangoes. At its simplest, the use of a common QC form should be encouraged for each consignment exported to Europe.

The QC form used by Veritas (Cote d'Ivoire) is used by one exporter, but could be used by all. The form, known to Malian exporters, could be adapted for Malian use by the packhouse consultant. It should incorporate a section that compares the specification of product ordered by the importer, with the product being exported.

The packhouse consultant and marketing consultant should guide the exporters in preparing action/contingency plans, to take place should a consignment not meet the required specification or order.

c. Common examination scheme :

It is recommended that the packhouse consultant encourages Malian mango exporters to develop a common export examination scheme.

Currently Mali's phyto-sanitary inspectors examine consignments of mangoes prior to export. The inspectors search for evidence of fruit fly contamination, and badly diseased/damaged fruit.

If the exporters are agreed, this inspection could be expanded to look at other quality issues. Or, an additional independent inspection could be organised with the help of the packhouse consultant, to ensure that all quality requirements are met. This inspection, could be tied in with the formation of a Malian Brand or 'Mark'.

It should be noted however, that the ultimate responsibility for each consignment must lay with the exporters. If a QC non-compliance issue is bought to the attention of the exporters, (by whosoever), resolution of the non-compliance must remain the exporter's responsibility, and they alone must face the consequences of not resolving non-complying exports/consignments.

d. Problems arising in Europe :

There is a strong feeling amongst exporters and others in the industry that importers complain unjustly of receiving poor quality mangoes, in order to reduce prices paid back to exporters.

This problem needs to be addressed and feedback given to exporters.

It is recommended that the consultant encourages importers to email digital photographs of problem consignments to the CAE internet room (Most serious importers are very pleased to do this). It is also recommended that the packhouse consultant liases with independent inspectors, who could, if necessary, examine 'problem' cargoes received in Europe

As an additional system, the packhouse consultant should encourage each exporter to retain a representative sample of each consignment of mangoes exported (eg 5-15kg) for shelf life trials. This is a practice which is standard for exporters world-wide. It would be useful, but not essential, if these samples could be maintained in an air-conditioned room. If a problem develops in (cooler) European countries, it is useful if an exporter when talking to the exporter can refer to/discuss his own observations of shelf life samples held in the exporting country.

VII- PACKAGING

7.1 Packaging used for exports from Mali :

Boxes received in the UK were considered to be of acceptable quality and design. In particular, they were formed only from card, which helps the importer meet legislation requirements for recycling of packaging. No plastic corners or metal staples should ever be used, (these result in disposal/recycling problems for the importer).

Large flaps on boxes are not essential (they also obscure the buyers view of the product) ; smaller flaps and strengthened corners would be acceptable, as long as the box is strong.

A comment was made by one importer that boxes used in the last season were too small for the larger Valencia mangoes. The Valencia mangoes stood proud of the boxes and were bruised by boxes stacked on top of them.

An additional problem was that box weights arriving in the UK stated 4kg, but actually weighed around 4.5kg. It is suggested that too much tare is given, which means that the exporter is giving away 10% extra product, and also means the importer/exporter pays >10% extra airfreight.

A comment was made that information on boxes is written in French. Whilst this is not a huge problem, it is advised that wording (if in French) is kept to the minimum that is required by (EU) law. The exporters contact details (address, tel/fax no.) must be placed on all boxes, and each box must be labelled with the variety, count, and net weight.

Malian exporters are generally advised to keep packaging costs down, and not add inserts or dividers, tissue etc., although one French importer has asked for dividers/tissue to be used to minimise rubbing of fruit and subsequent scratching/damage.

7.2 Recommendations for Malian Packaging trials :

It is recommended that the packhouse consultant helps growers to carry out the following packaging trials during the forthcoming season:

- identify whether the box sizes currently used (4kg and 5kg) are sufficient for all needs, or whether there is a requirement for an additional size/sizes for different varieties. The trials should be carried out in liaison with importers, using sample boxes of different dimensions.
- trials should be carried out for the French importer, using different impact absorbing materials in boxes, to minimise scratching /damage to mangoes during transit. (NB : it may be necessary to first establish that the scratches occur after packing, and not before.)
- Tare weight trials should be carried out with exporters. The aim must be to identify just how much tare should be added to a box, in order to ensure that minimum weights are never less than stated on the box, but excess weights of mangoes are not given away and airfreight charges not unnecessarily increased.

In addition, it has been noted that corner supports, straps and other packaging material are not available for purchase in Mali. It is understood that these materials will be purchased by CAE as part of its packaging support for exporters.

7.3 General :

The following information is for general reference purposes only.

The importance of appropriate packaging to the European market should not be underestimated. It is not only a means of containment and protection, but a form of marketing too. Poor packaging may result in high losses and will not attract the consumer.

There are several criteria involved in the selection of packaging, and further regulations covering the labelling. Recycling and disposal of packaging materials has become an important issue in Europe. It is important that boxes do not contain metal staples, or plastic clips/corners for example, because these adversely affect the importers ability to send packaging for recycling.

Boxes should be constructed from corrugated fibreboard. The fibreboard must be new, clean and suitable for food use.

Telescopic folding boxes, with separate base and lid, may be specified. However, it is more likely that less expensive open top trays, reinforced on all sides, will be preferred by importers. For airfreight, strong lightweight packaging should be considered. To improve the stability of a stack, open top trays should have nubs on the top and corresponding slats on the bottom so that they fit into one another when stacked.

The usual box dimensions are 30x40cm at the base with a height of 10-12cm. Box dimensions should in any case be designed to form the best fit on an international metric pallet. To allow air circulation, the box must have plenty of openings, without compromising the structure of the box.

Markets differ according to the preferred number of fruit per box and the net weight of each box. It is important to clarify the requirements with the importer.

The usual box sizes are either 4kgs or 5kgs with 6-14 fruit in each box. In the UK, a 4kg box has become customary, and, since mangoes are bought and sold by the box, it is clearly preferable to pack to 4kg.

As noted above, size uniformity is important and it is likely that tolerance levels will be set. Typically these might be:

Count	4kg box	Count	5kg box
8	460-520g	6	775-900g
9	420-460g	7	675-775g
10	380-420g	8	575-675g
		9	500-575g
		10	440-500g
		12	380-440g

Mangoes should be packed in a single layer so that they are secure, but not tight. Mangoes will lose some water (by transpiration) and thus weight during transportation (c. 4%). If they are loosely packed by the exporter, they will be even more loosely packed on arrival with the importer. Mangoes which are not tightly packed will move against each other and cause abrasions during transport.

The box should be deep enough that the fruits do not protrude above the top of the box. Where possible the stalk should be highest as this area will present the best colouring. Cardboard dividers or tissue paper can be used to add protection and reduce movement, or individual fruits can be wrapped in a stretched net of polystyrene. Alternatively, a layer of shredded paper in the bottom of the box helps to cushion the fruits.

The box must be legibly and indelibly marked with a number of identifying labels. The obligatory marks identify :

- the supplier, by name and address (or code) of the packer or dispatcher. A brand name is useful.

- the nature of the produce (ie Mangoes) and variety name.

- the country of origin.

- the commercial specification : class (if required), size in maximum and minimum weight, or a size code number, the number of fruit and net weight of kg.

It is not obligatory, but is desirable if the identity of the grower; with a coding for harvesting date is added to the box.

Boxes generally have to be stronger for seafreight, and more resistant to conditions of high humidity.

7.4 Packaging sources in Mali :

SOMEPAC is the only producer of cartons based in Mali. They produce only cartons, and do not supply other products – straps, corners, tissue etc.

Prices for 5,000 boxes x 5kg size, are 425CFA each,
10,000 boxes x 5kg are 400CFA each,
50,000 boxes x 5kg ar 380CFA each.

Heavyweight boxes cost 15% more than lightweight, and exporters have to pay for boxes in advance (when ordering).

Boxes are usually delivered printed with one or two colours, for three or more colours the costs rise 10%.

SOMEPAC can provide boxes of any dimensions and given a box can copy design/folds etc. They claim to be able to produce 5,000 boxes within three days of an order being placed.

Box dimensions : 4.5kg box = 35 x 27 x 11cm
Box dimensions : 5kg box = 40.l5 x 28 x 12cm

A tour was made of the box producing area. The site needs cleaning, including cleaning up of diesel oil (the forklift trucks appear to use diesel oil). With its current systems, the packaging supplier could not gain approval with UK multiples as a box supplier.

VIII- TRACEABILITY TRIALS

8.1 General :

In order to supply the UK market, and increasingly other European Markets, the subject of product traceability needs to be addressed in Mali.

There are three methods of achieving traceability :

i. using labels (generally a grower number) for each fruit supplied by a grower. Labels are applied after washing of product and grading out non exportable quality mangoes, but before placing the fruit into export boxes. Labels themselves have to be produced from food safe materials (especially the adhesive).

This system is only used for producers who have very large quantities of product. Correctly carried out this system gives a great deal of confidence to end customers regarding the traceability of fruit.

However, it is expensive to carry out and is probably not sustainable in Mali. Costs include the cost of producing quantities of different labels for each grower, and the labour used to attach them to fruit prior to packing. Also, it is not possible to apply this system immediately for the very large number of smaller producers in Mali.

ii. A second system is the use of labels or stamps on each carton, showing the name or producer number of the grower who produced the fruit contained in the box.

Labels are applied after product has been washed, graded and packed into final export cartons. Therefore this system requires that :

- each field crate of mangoes contains a label with the name of the fruits producer
- that the name of the grower is carefully noted as the fruit is unloaded and processed in the packhouse in order to ensure that export cartons are correctly labelled immediately after packing.

Grower names should be kept confidential between the pisteur and the exporter. Some concern has been expressed that openly labelling boxes will allow competitive pisteurs to 'poach' each others sources.

iii. Some systems, but generally those using a relatively small number of growers, use only paper records of traceability.

This involves exporters keeping precise written records of :

- What was bought on each date (variety, size etc), from each grower.
- The date on which the product was packed, and the date on which it was exported, and to whom it was exported.
- Detailed records of sales are made, including the variety, sizes of fruit and volumes sold. (An additional back-up, and generally these records are maintained for invoicing purposes).

If for example, only one or two growers' product is exported on any day, each consignment can easily be traced back to the growers, through the written records. (This applies particularly if the product from each grower is different in terms of variety or size).

The system does not work well however when many growers products are exported simultaneously on the same day/in the same consignment.

8.2 Recommendations for the implementation of traceability systems :

It is recommended that the packhouse consultant works with all exporters associated with the CAE project, and with their pisteurs. The aims of this work must be :

i. to reinforce the need for traceability systems if exporters are to export to the UK/serious importers.

ii. to design and implement workable traceability systems for each packhouse, using two methods :

a. By devising accurate purchasing recording – including the names of growers (this will also involve working/liasing with pisteurs).

b. By recording the name of each supplier as his product is packed and labelling the boxes accordingly.

It is not envisaged that a perfect traceability scheme will be possible/put into place during the 2001 season. However a serious attempt must be made. If everyone concerned in the industry becomes aware of a serious need for traceability, much progress can be made toward a more reliable system.

IX- DOCUMENTATION

9.1 General :

Internationally, most modern, well run packhouses have intensive systems of documentation, often stemming from the implementation of quality assurance systems, for example ISO9000. These systems cover every aspect of packhouse management, from a mission statement, procedures for receiving guests, and all accounting systems, as well as quality control of products marketed.

The level of documentation, whilst expensive and difficult to set up, is generally recognised as a good business management tool, once it is in place and operational.

Documentation was examined at the packhouses visited in Mali, and this was found to be quite basic, for the small packing stations being run.

The following systems were observed :

a. Records were kept of goods received from each pisteur. Details included :

- date
- pisteurs' name
- product received
- % which was acceptable
- % which was rejected, and the reason for rejection.

b. Exporters faxed details of consignments to importers, along with copy airway bill nos.

Stock records were not kept – the exporters generally do not have coldstores, and therefore did not keep stock for more than 24hrs.

9.2 Recommendations for documentation systems :

In view of the very simple packing stations in Mali, the consultant can see no financial advantage to the exporters in the production of intensive documentation/packhouse manuals, setting out procedures.

It is therefore recommended that the packhouse consultant does not burden growers with involvement in the production of a packhouse manual, (and the demands of implementing systems designed for larger, more sophisticated operations).

However, some systems, if implemented correctly by the exporter, could help them to retain customers by improving service levels, and building customer confidence.

It is therefore recommended that during the 12 week follow up period the packhouse consultant works with exporters, putting together documentation to record the following :

a. Detailed records of produce purchased, and from whom, in order that traceability of produce can be demonstrated.

b. Records of orders required, to be made available to pisteurs and packhouse staff, in order to encourage all in the system toward meeting orders with the correct variety, size and quality of mangoes.

c. Detailed quality control records of product prepared for despatch to a customer, and a comparison of these goods with the order supplied by the customer.

d. Detailed procedures plan showing what action packhouse staff and exporters should take, in the event that produce acquired for despatch does not comply with what has been ordered by the client.

ANNEX I

Mango exports from Mali

SUMMARY OF CONSTRAINTS, ADVANTAGES AND RECOMMENDATIONS

1. CONSTRAINTS OF THE MALIAN MANGO

The constraints upon the Malian export industry are well known :

- The different sectors of the industry – growing, harvesting and exporting are not integrated. Growers, harvesters/collectors (pisteurs) and exporters are all different groups of people.
- Those working in the different sectors – growers, collectors and exporters – do not have strong working relationships or mutual trust within the sectors, or between the sectors. This leads to difficulties such as :

  - Growers will not reserve production for a buyer unless a substantial deposit is paid in advance, eg 100,000CFA per ha. If buyers reserve fruit without payment, and subsequently do not collect and buy the fruit, the grower may lose his sale completely, or the mangoes may have to be sold on the local market at a lower price.
  - Buyers (collectors/exporters) will not pay in advance because they do not trust growers to fully reserve crops or maintain them well and, if a natural catastrophe occurs after payment of an advance, the buyer risks losing his financial investment.

- Growers do not invest substantially in production because they cannot be sure of selling their mangoes. As a result, production is poor with many fruits not of exportable quality (due primarily to infestation by fruit fly).

- Production of mangoes has not been organised for export. Although exportable varieties are grown, these are in the minority and are frequently mixed in orchards with non exportable varieties, making harvest of export qualities complicated.

- Mangoes are frequently harvested from tiny orchards, leading to produce from up to 30 growers being exported in the same (relatively small) consignment. Collection of fruits from so many different sources, by many different harvesting teams (each with different systems and harvest/delivery times) is sure to lead to a lack of uniformity amongst the harvested fruit, in terms of shelf life, speed of ripening, etc.

- The collectors are simply traders. They have no particular loyalty to growers, or exporters, and no vested interest in delivering truly top class mangoes, or indeed the variety/size required (and requested) by the exporters.

- Malian exporters do not have the same level of finance available as large exporters in other countries.

- There are no credit facilities available for exporters (or collectors and growers), but all product and packaging material has to be paid for at the time of purchase or in advance.

- Individual exporters' packhouse facilities are generally limited. Only one of the exporters expected to export mangoes in 2001 has cold storage facilities. (Maliprimeur).

- Exporters and others in the industry, do not have a good understanding of the intensely competitive nature of European imports for mangoes (and other crops). They are not yet orientated toward providing the level of service required by importers. For example, UK importers complain that the varieties of mango and sizes they order are not supplied. Instead, without any discussion or warning, Malian exporters supply whatever products they have. This leaves UK importers with :

  - client orders they cannot meet,
  - varieties/sizes of mangoes for which there is no market.

- Some problems have been experienced with mixed degrees of ripeness in boxes, the result of poor handling or grading systems.

- Another importer has complained that he requires fully ripe fruit to withstand cold UK ambient temperatures (he does not have temperature controlled storage). Despite repeated requests, he still receives fruit which is backward/under-ripe, and which is subsequently damaged and devalued by cold ambient temperatures.

- Highly coloured fruit is required by the market, but not always supplied by exporters.

- Other constraints for the local mango industry include the fact that Mali is landlocked. It has good access to the Port of Aberjan, but the journey from Bamako can take a container up to two days to complete.

- The local packaging industry is not well developed – boxes are available, but not pallet corners, plastic strapping, or paper tissue (requested by one French importers).

2. ADVANTAGES FOR MALIAN MANGO EXPORTERS

Despite its many constraints, the Malian mango industry does have some very strong marketing advantages :

- The inherently good eating qualities of the mangoes grown in Mali – good flavour and fruit texture – have been appreciated for many years, and continue to be well appreciated in Europe.

- None of the importers have complained that individual fruit quality is poor. Indeed many say that fruit are visually good, as well as good to eat. (Problems have arisen when incorrect qualities/sizes are exported.).

- There are huge areas of mangoes grown. Much of this area is of the varieties required for export, and has the coloration required by importers.

- Growers and agronomists are experienced in grafting export varieties onto existing rootstocks. The grafting of export varieties onto mature trees (rootstocks) is reported to result in harvests of export variety fruit within two years.

- The lack of use of pesticides by growers is a distinct advantage when exporting to Europe. Residues of pesticides are greatly feared by European importers and consumers alike.

- The dry climate during harvest is reported to minimise the incidence of fungal disease development.

- Exporters are committed to exporting mangoes and increasing levels of exports.

- Exports from neighbouring countries, particularly from Côte d'Ivoire, prove what can be achieved in the region.

- It is possible to export by sea via Abidjan. Refrigerated containers are available in Mali (Bamako and Sikasso). Controlled atmosphere containers could be provided, giving a longer product life for exported mangoes.

- Air freight charges are relatively low compared to other mango exporting countries, and freight space appears to be widely available.

3. RECOMMENDATIONS FOR THE 2001 SEASON

The following recommendations are made for work to be carried out by the short term packhouse consultant.

The recommendations are made to ensure training/dissemination of information to all concerned in the export of mangoes from Mali, and is both sustainable, and capable of being achieved during a short term (12 week) packhouse management consultancy period.

3.1 - Customer Service

Currently, Malian exporters have a bad reputation in the UK for supplying incorrect varieties and sizes of mangoes. In France one importer regularly receives product which has to be re-graded and repacked.

The lack of a strongly service-orientated exporting sector will hinder the development of mango exports, and should be addressed.

It is therefore recommended that the packhouse consultant should organise two types of training in country, on the subject of customer service :

c. a poster publicity campaign targeted at all in the handling chain, and
d. a training programme, providing specific training courses for packhouse management staff.

a- Poster Campaign

The power of a strongly worded publicity campaign cannot be underestimated. For example, the Dutch horticultural reputation for uniformity of product, and careful postharvest handling was largely the result of a sustained publicity poster campaign, targeted at growers and their staff.

It is recommended that relatively large numbers (say 150-200 in total) of laminated illustrated, information posters (A3/A4) are produced within the project. These should be distributed to exporters, packhouse management and staff, to encourage them to achieve higher levels of product handling and customer service. Further distribution of posters to pisteurs and growers should be supported.

Messages should be simple, (and where appropriate amusing). They should be written in French and Bamana, and generally carry only one message per poster. Ideally these should be produced in a graphic form (with few words), adapted to the local culture/style of publicity.

Posters should give new information, but also strongly re-inforce information already known to all sectors. It is recommended that posters conveying the following messages are produced:

- Mangoes which have been dropped at any stage will not survive transport to Europe and should not be exported, but sold on the local market.
- Exporting damaged mangoes damages the reputation of Malian mangoes.
- Each client in each country, has different, individual requirements and must be treated as an individual.
- Supplying importers with exactly the variety, quality, size and quantity of mangoes they require is vital, or clients are lost forever.
- Details of common quality standards (see section 3.4b below) could be posted at packing stations for everyone's information (pisteurs and growers, as well as exporters and staff).
- Repacking of product in Europe costs Malian exporters 5000CFA per person per hour (a poster of this type may have limited distribution, but should capture the attention of exporters themselves).
- Malian exporters are stronger if they work together as one industry, each exporter with his own clients.
- Distribution of posters displaying identifying characteristics of the main export varieties could help improve/reinforce accurate sourcing, packing and labelling of export varieties.

b- Training Programmes/Seminars

It is further advised that a training meeting should be held with exporters to discuss :

- The implications of European regulations on exporting countries. Particular emphasis should be made of the fact that importers in Europe are increasingly abiding by EUREP – guidelines on food safety, environmental safety, work practices and social standards.
- Those parties who ignore the new requirement of the markets or fail to respond to the new higher standards will inevitably find themselves disqualified from supplying the major retailers – who buy in volume, and generally give the best returns.
- The winners amongst exporters will be those parties who can demonstrate that they exercise due diligence over the production process, and employ work practices that meet or exceed the minimum food safety, health, environmental and social standards required by European legislation and consumers alike.
- It should also be noted that the development of new risk management systems, which allow a more direct or traceable relationship between retailers and producers, could threaten the role of the traditional intermediaries (the pisteurs).

In order that they can be helped to understand the requirements of the market, it would be advisable to include the most respected pisteurs to the same meeting, (eg. the President of the Association of Pisteurs in Sikasso; and those serious pisteurs recommended by exporters). The intention would be to encourage pisteurs to work with exporters in meeting requirements of traceability etc.

3.2 Recommendations re. Seafreight trials

The following recommendations are provisional on cold storage being available :

f. If coldstores become available in the area, export trials by seafreight from Sikasso should be supervised by the consultant. The work should be carried out with the Co-operative
Mali Yiridan, and exporters known to the project who are willing to work in that region.

g. Maersk shipping lines should be used to transport the product.

h. Although Maersk can provide controlled atmosphere containers, it is not advised that these are used for initial consignments.

i. If coldstores do not become available in Sikasso, pooled seafreight trials could be carried out from Bamako. This will involve consultant training of harvesting, grading and
packing staff, in the requirement for seafreight quality mangoes, as opposed to the airfreight mangoes they are well used to exporting.

j. If it is not possible to arrange seafreight trials from Sikasso, and seafreight trials are envisaged from Bamako, it may be advisable to first arrange pooled charter of freight planes[4].

[4] It is understood that freight charter is relatively simple to arrange from Bamako to Europe at short notice, although this is not the author's experience of air cargo chartering in other parts of the produce exporting world.

This would give Bamako exporters the opportunity to become accustomed to supplying the correct quantity of mangoes together as a pool, at the required time.

Freight could be held in coldstores at the airport for a short period (say 10-15 hours) to allow for consolidation. A charter airfreight trial such as this has the advantage that one learning curve – selection of fruit for maritime export by the Bamako sector - need not apply.

However the financial risks are extremely high ; it should only be attempted if there is full confidence in the growers' ability to supply product, if the growers are fully committed to exporting en masse, financially committed as well as verbally, and if there are significant financial benefits from reduced freight charges, compared with normal cargo charges.

3.3 Recommendations for post harvest handing in Mali

In view of reports that handling systems in packhouses are extremely poor, with fruit being thrown, dropped and subjected to general poor handling, is recommended that the packhouse consultant:

- Organises a series of training days for core packhouse staff on the subject of post harvest handling and packing of mangoes.
- Supervises on site handling, grading and packing training of daily recruited staff, for at least one day at each packing station.
- Produces a simple mango handling guide to be funded by the project, and handed to each packhouse worker to read. The worker should be made to take the guide seriously, signing that the guide has been examined and understood. Literacy problems amongst workers may mean that the guide is simply an illustrated guide.
- Packhouse management should be encouraged to keep a record of staff training, and should themselves train new members of staff.

3.4 Recommendations to address quality issues in Mali

a. Quality Standards

In order to enable exporters, pisteurs and growers to work together, each must have the same, clear idea of a common standard.

It is strongly recommended that Malian exporters work together with the packhouse consultant, and agree a common standard for all to work by. At its simplest, this could the EU standard (already circulated to some exporters), but it needs to be discussed and agreed amongst exporters.

b. Quality Assurance

The adoption of good quality assurance systems is key to improving the quality of produce and service provided to customers.

It is recommended that the packhouse consultant should work with each individual exporter, and develop and implement quality control systems for exportation of mangoes. At its

simplest, the use of a common QC form should be encouraged for each consignment exported to Europe.

The QC form used by Veritas (Cote d'Ivoire) is used by one exporter, but could be used by all. The form, known to Malian exporters, could be adapted for Malian use by the packhouse consultant. It should incorporate a section that compares the specification of product ordered by the importer, with the product being exported.

The packhouse consultant and marketing consultant should guide the exporters in preparing action/contingency plans, to take place should a consignment not meet the required specification or order.

c. Common examination scheme

It is recommended that the packhouse consultant encourages Malian mango exporters to develop a common export examination scheme.

Currently, Mali's phyto-sanitary inspectors examine consignments of mangoes prior to export. The inspectors search for evidence of fruit fly contamination, and badly diseased/damaged fruit.

If the exporters are agreed, this inspection could be expanded to look at other quality issues. Or, an additional independent inspection could be organised with the help of the packhouse consultant, to ensure that all quality requirements are met. This inspection, could be tied in with the formation of a Malian Brand or 'Mark'.

It should be noted however, that the ultimate responsibility for each consignment must lay with the exporters. If a QC non-compliance issue is bought to the attention of the exporters, (by whosoever), resolution of the non-compliance must remain the exporter's responsibility, and they alone must face the consequences of not resolving non-complying exports/consignments.

d. Problems arising in Europe

There is a strong feeling amongst exporters and others in the industry that importers complain unjustly of receiving poor quality mangoes, in order to reduce prices paid back to exporters.

This problem needs to be addressed and feedback given to exporters.

It is recommended that the consultant encourages importers to email digital photographs of problem consignments to the CAE internet room (Most serious importers are very pleased to do this). It is also recommended that the packhouse consultant liases with independent inspectors, who could, if necessary, examine 'problem' cargoes received in Europe

As an additional system, the packhouse consultant should encourage each exporter to retain a representative sample of each consignment of mangoes exported (eg 5-15kg) for shelf life trials. This is a practice which is standard for exporters world-wide. It would be useful, but not essential, if these samples could be maintained in an air-conditioned room. If a problem

develops in (cooler) European countries it is useful if an exporter when talking to the exporter can refer to/discuss his own observations of shelf life samples held in the exporting country.

3.5 Recommendations for Malian Packaging trials

It is recommended that the packhouse consultant helps growers to carry out the following packaging trials during the forthcoming season :

- identify whether the box sizes currently used (4kg and 5kg) are sufficient for all needs, or whether there is a requirement for an additional size/sizes for different varieties. The trials should be carried out in liaison with importers, using sample boxes of different dimensions.
- trials should be carried out for the French importer, using different impact absorbing materials in boxes, to minimise scratching /damage to mangoes during transit. (NB : it may be necessary to first establish that the scratches occur after packing, and not before.).
- Tare weight trials should be carried out with exporters. The aim must be to identify just how much tare should be added to a box, in order to ensure that minimum weights are never less than stated on the box, but excess weights of mangoes are not given away and airfreight charges not unnecessarily increased.

3.6 Recommendations for the implementation of traceability systems

It is recommended that the packhouse consultant works with all exporters associated with the CAE project, and with their pisteurs. The aims of this work must be :

iii. to reinforce the need for traceability systems if exporters are to export to the UK/serious importers.
iv. to design and implement workable traceability systems for each packhouse, using two methods :
    c. By devising accurate purchasing recording – including the names of growers (this will also involve working/liasing with pisteurs)
    d. By recording the name of each supplier as his product is packed and labelling the boxes accordingly.

It is not envisaged that a perfect traceability scheme will be possible/put into place during the 2001 season. However, a serious attempt must be made. If everyone concerned in the industry becomes aware of a serious need for traceability, much progress can be made toward a more reliable system.

3.7 Recommendations for documentation systems

In view of the very simple packing stations in Mali, the consultant can see no financial advantage to the exporters in the production of intensive documentation/packhouse manuals, setting out procedures.

It is therefore recommended that the packhouse consultant does not burden growers with involvement in the production of a packhouse manual, (and the demands of implementing systems designed for larger, more sophisticated operations).

However, some systems, if implemented correctly by the exporter, could help them to retain customers by improving service levels, and building customer confidence.

It is therefore recommended that during the 12 week follow up period the packhouse consultant works with exporters, putting together documentation to record the following

a. Detailed records of produce purchased, and from whom, in order that traceability of produce can be demonstrated.

b. Records of orders required, to be made available to pisteurs and packhouse staff, in order to encourage all in the system toward meeting orders with the correct variety, size and quality of mangoes.

c. Detailed quality control records of product prepared for despatch to a customer, and a comparison of these goods with the order supplied by the customer.

d. Detailed procedures plan showing what action packhouse staff and exporters should take, in the event that produce acquired for despatch does not comply with what has been ordered by the client.

3.8 Additional recommendations

i. Organic/Biological production. Follow up with Mali Yiridan in Sikasso, and ascertain whether the accreditation scheme that visited in the region in the last season, will be exporting in 2001. The accreditation organisation was believed to be a German organisation called ECOSER.

ii. ISCOS (Italian NGO) support of Mali Yiridan – follow up and establish whether a cold store will be provided for the 2001 season (although as building has yet to start, it is thought unlikely that such a facility will be available in 2001).

Contact details : Stefano Capotorti, ISCOS,
Tel : Bamako 24-94-94

FOOTNOTES :

The above recommendations are made in relation to the expertise of the packhouse consultant.

It is noted that the project at CAE is also carrying out trials to encourage mutually beneficial relationships between growers and exporters, notably by linking fruit fly management programmes carried out on farm, with direct sales to exporters. The advantages of this programme are :

- using fruit fly control programmes, growers can expect to have more exportable quality mangoes for sale, and hence bigger returns to the farm. Use of IPM methods supported

by the project will ensure that no pesticides are sprayed onto fruit, and pesticide residues should not become a limiting factor for exports.

- removing a link (pisteurs) in the export chain will enable growers and exporters to share the pisteurs' profit margin (even if staff have to be recruited to carry out the harvest / transport crops).
- exporters will have more certainty about what crops will be available for them to export, which means they can offer more product to clients, with more confidence.
- Exporters will also be better able to demonstrate traceability of product (an essential marketing tool).

In addition, CAE is organising :

- a pool of exporters, possibly to share export transportation (sea/air),
- a pool of exporters to share packaging (cartons etc.),
- establishment of a Brand or 'Mark' for exportation – common to exporters in scheme.

ANNEX II

Meetings with UK importers of Malian Mangos

1. Visit to Unique, Spalding, Lincs on Tuesday 17 October, 2000

A meeting was held with Mr Rajesh Dodhia, Director of Unique. The following points arose :

General

- Unique clients are generally caterers and wholesalers. Unique also has access to UK multiples via trade connections, and also markets produce in Germany and France.
- Unique are willing to promote Malian mangoes during March – June, but require equal commitment from Mali – ie. an exclusive contract. It is unclear whether there is a requirement for exclusivity in the UK or also the rest of Europe.
- There has been no clarification of commitment, or indication of potential exports for the approaching season, and Unique are at their planning stage now.
- Publicity material re Malian mangoes would be required from the CAE Project/Mali, (in English).
- Unique have easy access to ripening rooms and coldstorage facilities.

Product received from Mali

- The quality of mangoes received from Mali is generally high, with good flavour and texture.
- Problems were experienced with mixed maturity in boxes.
- Fruit with good colour is required in order to obtain the highest prices.
- A trial of highly coloured fruit, exported by sea is required.
- Problems were experienced because exporters did not respect orders. The varieties and sizes of mangoes received were not exactly as ordered.

Packaging

- Boxes received were generally acceptable. In particular they were formed only from card, which helps the importer meet legislation requirements for recycling of packaging. No plastic corners or metal staples should ever be used, (these result in disposal/recycling problems).
- Boxes used in the last season were too small for the larger Valencia mangoes, which stood proud of the boxes, and were bruised by boxes stacked on top of them.

- Box weights stated 4 kg, but actually weighted around 4.5kg. It is suggested that too much tare is added, which means that the exporter is giving away 10% of product. It also means the importer/exporter pays >10% extra airfreight.

- Box information is written in French. This is not a huge problem but it is advised that wording (if in French) is kept to the minimum required by (EU) law.

- Malian exporters are advised to keep packaging costs down, and not add inserts or dividers, tissue etc.

- Large flaps on boxes are not essential (they also obsure the buyers' vision of the product) ; strengthened corners will be fine as long as the box is strong.

- Exporters contact details (address, tel/fax no.) must be placed on all boxes.

- Each box must be correctly labelled with the variety and count.

Freight

- Unique require sea freighted product from Mali in June/July when volumes of imports are high.

Note : This is the beginning of the Malian rainy season and anthracnose could occur now. It is the consultant's opinion that in view of the limited postharvest treatments available in Mali, it is not advisable to sea freight mangoes at this time in 2001. Howeve,r seafreight in May to arrive in June may be acceptable – dependent on weather conditions at the time of harvest/shipment).

- Unique is investigating the possibilities of charter aircraft 1 per week x 30t

Traceability

- Traceability is required by box and by date (ie a grower number or name should be put on each box), ideally with the date of harvest. There is no requirement for fruit labels with grower numbers.

Other Crops

- Unique are looking for melons, yellow by seafreight, galia melons and orange flesh melons including Canteloupe and Charontais, by air.
- there is considerable demand for organically produced product.

2. Visit to Pauls, Western International Market, London, 18 October 2000

A meeting was held with Mr. Harish Lakhani.

General points

- Paul's have their Headquarters in Leicester, and a wholesale market stand at London's Spitalfield wholesale market, as well as the site at Western International wholesale market.

- Imported airfreight product arriving in the UK is delivered to the Western International site, inspected and sold or sent to Leicester/Spitalfield as appropriate.

- Paul's customers are all ethnic retailers, and clearly Paul's marketing is specific for their requirement.

- Mali's competitors for mango sales include :

    - In March and April, Malian exports clash with Puerto Rica sea freight product. This is visually good, but the flavour is poor. However seafreight fruit costs UKP £2.30-3.50 box, airfreight £4.00-5.00, and price is important.
    - Mr Lakhani explained that Paul's were able to buy good quality Kent and Keitt mangoes from Israel, by seafreight, at UKP £2.00-2.50 at the same time as Mali is exporting airfreight mangoes.

- Ivory Coast seafreight mangoes are visually good, but the flavour is poor, price UKP £2.30-3.00 box

Quality of product required

- With this importer, the main competitors for market sales are the Indian exporters of Alphonso mangoes.

- Indian consumers do not want red fruit.

- The ethnic market likes the Indian variety Alfonso.

- Indian Alfonsa mangoes by airfreight cost £4.00 – 5.00 box, and the ethnic market will pay this, as a one time per year treat.

- Fruit with 70% colour and fully ripe, sent to this customer, will generally make good prices.

- The variety Amelie is fibreless and firm ; it stores well in the ambient market, and is small. There is however, no premium.

- Keitt is less acceptable because of the colour problem.

- Mr Lakhani considered that the best thing for Malian exporters would be to send him well coloured Amelia and Kent.

- Paul's do not have access to cold storage or ripening rooms. In Feb/March airfreight under-ripe mangoes do not ripen in the cold ambient temperatures of the market, and are ruined as a result of chilling injury. Fruit by air to this client must be ripe in Feb/March (only), it then holds well.

- If an exporter has problems supplying precisely what is ordered, he must telephone and discuss the problems with the importer

Comments on Malian Product

- Malian boxes are not correctly labelled (and the importer may be fined).

- Grading into boxes is sometimes incorrect with too much space in the box.

- Oddly shaped mangoes should not be exported, but should sold on the local Malian market.

3. Meeting with Redbridge, Surbiton, London, 18 October 2000

A meeting with Alan Crockford was held. The following points arose :

- Redbridges customers are wholesalers supplying independent retailers and caterers. They do supply UK multiple retailers, but not with mangoes.
- Redbridge have their own coldstore and ripening room facilities.
- Box sizes generally received are 30 x 40 x 10cm.

Comments on Malian Mangoes

- Mali has provided a poor quality of customer service.

- Redbridge received fruit from Mali which was incorrect in all respects - incorrect colour, variety and size.

- Red colouration of fruit is good.

- Their requirement is only for coloured fruit ; Keitt from S. Africa is 50% red. Kent is always well coloured.

- Other than poor colouration, the individual quality of fruits received from Mali and the grading are both acceptable.

- Commercial prospects are compared with seafreight from Ghana, Ivory Coast and Kenya. Redbridge do not trust exporters from Mali to correctly fulfil orders (with the correct variety, size and colour). There is therefore no possibility of orders for seafreight fruit until airfreight is correctly carried out, repeatedly. (This is a huge commercial disadvantage of the exporters' own making).

Advice for Malian Exporters

- The variety Irwin sells well on wholesale market in sizes 10's/12's if coloured red.
- Redbridge do not require the mango variety Amelie. It is the wrong colour for Redbridge customers, who want red fruit.
- Malian exporters should produce and use a branded box.
- Packaging design (other than branding) is acceptable, although an open box with smaller flaps is better. (Buyers like to be able to view fruit in boxes, without opening the box).
- Mali should decide on its target market - the UK or France. If Mali wants to export significantly to the UK, they must learn English to communicate with importers, and print boxes and literature in English.
- The lack of use of English is perceived as a lack of commitment.
- Malian Exporters should commit to export programmes, whether 20 tonnes per week or 40 tones per week. Ideally they should provide two deliveries every three weeks.
- Redbridge have no programme for Malian mangoes (they have already agreed programmes with supplies from other areas).
- A traceabilty programme must be put in place to give importers confidence.
- Exporters must be aware that pesticide residue tests are carried out.
- Written records of pesticides used (the product, the active ingredient, the date used etc.) must be maintained, including products used in mango washing water.
- There is a demand for organic mangoes, but probably small volumes.
- Shelf life – to meet shipments, weekly airfreight consignments should have a shelf life of at least one week, but if they are graded as ripe and less ripe (ie. some to sell immediately and some to sell after 3/4 days, that would be optimum service).

Other crops with potential

- Mali must concentrate on getting mangoes correct first.
- Fine beans are a possibility. All year round beans (var. Paulista), at 4 – 6 tons week will be paid at £3.50 per 2kg box .
- Papaya – solo varieties all year round.

ANNEX III

Record of meetings held in Mali

Tuesday 24 October 2000

1. Meeting with AMELEF

Present : M. Nguessan,
Madame Touré (President of AMELEF)
M. Amadou Niane (Fruitex)
M. Servoni.

Topics covered included :

- a general outline of the Malian procurement chain and problems associated with pisteurs (lack of information/reliability/communication facilities).
- the situation regarding the packhouse in Sikasso (currently reclaimed by the Bank, possibly to be sold, possibly to be reclaimed by the owner).
- adverse developments with the cold storage facilities at the airport (chiefly misuse of facilities/lack of maintenance).
- lack of a strong cold chain system available in Mali.
- opportunities for other crops from Mali.
- the importance of :
  - respecting the orders given by importers exactly, particularly in terms of goods exported precisely meeting orders, in terms of size, variety and colour of mangoes.
  - respecting the need for traceability of products (examples of the windward isles banana growers system were given).
- use of the CAE Project fruit fly control programme to attract growers on nine sites to forward plan the marketing of their crops, via designated exporters.

2. Visit to the packhouse of M. Amadou Niane (Fruitex)

Discussions centred on :

- the current systems of purchasing and handling goods (fruit from 15 regular pisteurs/suppliers, plus 15 'casual' suppliers).
- fruit is only purchased from around Bamako.
- records are kept of purchases made (including volumes, % outgrades etc.).

- relationships with intermediaries (pisteurs) and growers, which are variable, but generally not reliable.

- the degree of information which passes between the exporters and the pisteurs, and between the exporter and importer (there is an exchange of information, but it is not reliable).

- an examination of the systems/equipment used by M. Niane.

    - product is harvested in the day time, brought to the station during the evening and stored under lean-to shelters during the night. It is packed during the following day. This delay in packaging product allows any scratches/bruises on the fruit to develop and be seen prior to packing.

A meeting was planned with the pisteurs supplying M. Niane, on 2nd November at 2pm, in order to discuss the possibility of obtaining advance information on supplies in the field for the coming season.

3. Visit to Flex Mali – Mr Malinke

A visit was made to Flex Mali, and discussions held with the owner's son, the Managing Director of the business.

Flex Mali has been supplying a customer in Rungis market for fifteen years, and is happy with his relationship with them. He ships green mangoes, which the importer ripens, sorts, selects and repackages if necessary. The only problem of which the importer complains is slight damage to the skin of the fruits ("scratches"), which they believe are caused by movement of the fruit in boxes. They have asked that extra packaging material (tissue) be laid around the fruit inside the box, to prevent this damage.

Flex Mali use a 5kg box for exports to France. The box dimensions are 40.5 x 28 x 12cm, This is somewhat larger than the 4.5kg box used to export to the UK, but Mr Malinka feels that the box is not too big; he needs this size to accommodate the different varieties of Mango he packs.

Generally :

- Mr Malinke prefers to works alone he does not trust his fellow exporters to be professional (with one or two exceptions who are more trustworthy). He cannot therefore rely on others for help/product. He never buys fruit from other exporters to meet an order, but sells to them if it possible to do so, when requested.

- He has 15 pisteurs who collect product for him using pick up trucks. He collects fruit only from the area around Bamako.

- Mr. Malinke estimated that there are around 400-500 pisteurs in Bamako.

- There is no national or association specification[5] for mango fruit, and whilst Mr Malinke thought this a useful tool to improve professionalism within the exporters group, he felt a national specification would not cause any change to the way in which he worked.

- his handling procedures are :

    - harvest a.m.
    - delivery by pickups between 11.00 and 3.00, store at ambient (no coldstore).
    - product is packed by the end of the day, and airfreighted the same day, or the next day. (He does not allow bruises or scratches to develop before packing).

- Mr Malinke considers that his biggest problem is the lack of professionalism (reliability) in all sectors of the industry (collectors, transporters, box suppliers etc). In the 2000 season, he shipped 42T to England by air and 175T to France, also by air. He tried to seafreight a 40' container to Europe, but the container was late arriving and too many problems were experienced.

He faxes details of each consignment to the importer, when it is ready to be exported.

4. Visit to the phyto-sanitary Inspectors and cold store facilities at Bamako airport

A meeting was held with Manzon Keita, the Manager of the Phyto-sanitary facility and his staff.

The following points arose :

- Mr Keïta is clearly enthusiastic that the mango exporters of Mali should adopt more a professional approach in terms of post harvest handling of mangoes.

- The major problem for the phyto-sanitary inspectors is fruit fly. If flies are found in a consignment, exporters are given an opportunity to replace infected fruit, in order that the consignment can be delivered.

- The P.S. inspectors also look for major product defects, rots etc.

- There is, superficially, an enviable range of produce handling facilities at the airport, including :

    - One small packing station (very approximately 200metre square,) with two stationary 40' refrigerated containers, leased by SAGA.
    - A very large packing station with two cold stores leased from the airport authorities by TAM.
    - A large packing station with coldstores, leased from the airport authorities by Continental.

[5] There are national standards in process of development for both Mangoes and Green Beans

Regrettably, all facilities have been very severely neglected : they are in need of substantial amounts of cleaning and repair. It is doubtful that any of the coldstores/cold storage facilities run efficiently.

- In the past, the facilities have been used to grade, pack and cool mangoes, which have then been loaded into containers. The containers are inspected by the phyto-sanitary inspectors, then customs inspectors, and then sealed for ease of passage to Abidjan, for export by seafreight.[6]

- Product can also be packed into refrigerated lorries for despatch to Abidjan. However, if lorries are used, additional difficulties may be experienced with customs at the borders, particularly at Abidjan, where product may reheat whilst being inspected by port authorities.

- The distance between Bamako and Abidjan is 1200km. Sikasso to Abidjan, 800km.

Thursday 26th October 2000

1. Meeting with Mali Yiriden, Sikasso

Present : M Coulibaly, exporter and co-op member
M Ouattara, co-op member
M. Abdoul, co-op member
Mr Stefan Capatorfi, ISCOS (Italian NGO)
M. Boubacar Moulaye, ISCOS, and President of Co-op

- Mali Yiriden is a Co-operative of 12 members with a committee of 5.

- The co-operative was formed in 1991, principally to assist with produce marketing. They do not export produce themselves, although they assist exporters, and indeed growers and pisteurs.
- Mali Yiriden markets melons, oranges, potatoes, and mangoes, for export and for local markets all over Mali.

- Stefan Capatorfi of ISCOS has worked in Mali for nine years. He works with two co-ops, Mali-Yiriden a marketing co-operative, and Cikela-Jig, who arrange supplies of inputs for growers.

- The goal of ISCOS to set up co-ops to provide services for producers and consumers, locally and in export countries. They are investigating the possibility of providing coldstores for Mali Yiriden.

- The grading/packing area is open air, but sheltered (not inspected in detail).

- The co-op employs :

[6] Subsequent discussions with others involved in the industry suggest that even if containers are sealed, problems can still be incurred at borders, with customs officers demanding money to allow consignments to pass.

- three researchers to find and buy product.
- 5 people for administration.
- 1 person for sales.
- 1 person in charge of transport, assisted by two others.

- The co-op has four vehicles in total, two refrigerated, with 25t capacity.

- The co-op works in 360 villages, with10-20 growers per village. 30% of growers provide oranges, 30% bananas.

- In Sikasso there are 20 big producers of mangoes (more than 50ha each), 150 medium producers (5-15ha each), and around 200 small growers (2-5ha each). Total 370 mango growers.

- The 370 growers work with all exporters/pisteurs. 92 growers supply mangoes to Mali Yiriden, but do not supply Mali Yiriden exclusively. 50% of growers change each year. 50% are regular suppliers. The co-op works with 30 pisteurs of the 45 pisteurs in the region.

- Mango yields are 2-3 tons export quality/ha, for an average grower with an average size farm. A large grower, with good expertise may harvest up to 8 tonnes/ha.

- Mangoes are collected from the Sikasso region – which is huge up to 3 hours drive from Sikasso town.

- Varieties grown are :

Amelie 40% of all mangoes
Keitt 20% of all mangoes
Kent 15% of all mangoes
Beverly)
Brooks) Rest
Valencia none

- The first predictions on likely yields/volumes are generally made at the end of January. Decisions on likely volumes are based on flowers produced. Predictions are not accurate in advance.

- It would be possible for the co-operative to make 'ball park' estimations of volumes expected, 6 months in advance, and to monitor/revise these predictions up to harvest.

- A pool was formed in 2000 to use the AOM packing facilities in Sikasso. The following were involved with AOM in the pool : Mali Yiriden (procurement), Fruitière du Lotio (procurement), Interagro (administration).

- Mali Yiriden works with 6 exporters :
  1 exporter from Sikasso

2 exporters from Bamako
3 x exporters from Côte d'Ivoire

Note : It took 2.5 hrs of discussion and consideration to obtain estimations of the number of growers in the region and the estimation of varieties by percentage.

2. Visit to Grower – Soumaila Diarra

A visit was made to a grower based near Waibera Village, 6 km from the tarmac road, approximately 45 minutes from Sikasso Town.

- The grower has 5ha of Keitt, Kent and Ambassador, grafted onto Brooks rootstock. Generally the trees were 10 years old and approximately 70% were believed to be Kent. Varieties were mixed within the orchard.

- The grower had very little idea of his yields. In the last season (2000) the picks (exportable quality) were as follows :
  1st pick = 30 cases of 18kg each
  2nd pick = 20 cases of 18kg each
  3rd pick = 73 cases of 18kg each.
  Total : 123 x 18kg = 2, 214 (exportable quality) from 5ha.

- The remainder of the crop is picked for local markets.

- The grower had no ideas regarding the size of fruit – no idea of weights/count. He guessed at 250 gram per fruit.

- The only work carried out in the field by the farmer and his son was that the surface of the orchard was dug over (by hand) to kill grass. This is to prevent fire in the undergrowth and consequent damage to trees/fruit. No fertiliser or pesticides were applied.

- Harvest was carried out by the pisteurs (male) who climb trees, cut fruit individually and drop the fruit to a catcher who places the fruit, stem down, to drain the latex.

- The men harvest all day.

- However, no harvest is carried out during rain as wet fruit allows anthracnose to develop.

Friday 27th October 2000

1. Meeting with M Kassoum Berché, Manager of the Association of Pisteurs of Sikasso.

- There are 30 pisteurs in the Association and, in addition, pisteurs from Côte d'Ivoire and 15 other Sikasso pisteurs who are not in the Association work the area.
- Generally, there are good relationships amongst pisteurs.

- Pisteurs buy all quality of fruit, because this is less expensive per kg. To buy only the required quality is more expensive per kg.
- The first visit is made to growers in December. (The very first flowers appear from November). Pisteurs have an Idea of forecasted yields then.

- Pisteurs change the growers they work with by about 50% each year.

- The pisteurs have problems with lack of money – they have to buy all fruit at the farm gate.

- Fruit size affects price.

- Average yields are 100 boxes x 18kg/ha export quality (1.8– 2t/ha), plus 6tonnes local market. (Figures are based on 45 boxes x 18kg on each pick up, two trips per field).

- Grower numbers are approximately :

- 350 producers,
- 200 good producers supplying 2t/ha of export quality mangoes,
- 40 very good growers who produce 2t/ha export quality, and are also good to work with. However, they work with all pisteurs.

- Generally, a pisteur visits one or two (adjoining) growers per day.

- A biological/organic accreditation scheme, ECOSER, from Germany arrived in 2000 and was beginning to put documentation in place for Bio (organic) production. For the approaching season, it is expected they will begin biological harvest on perhaps 200 ha for Ecoser. AOM were to buy the mangoes.

- The major problems for pisteurs are the exporters. Malian exporters not good – they have no money, and are not good buyers.

- Côte d'Ivoire buyers have more money and buy more tonnage, of all grades, but the packing stations are a long way away. eg. five Ivory Coast packhouses are 200km away.

- However, Côte d' Ivoire stations are open for 24 hrs – the pisteurs telephone the packing station when they are 30 km away. The Malian station in Sikasso closed at 19.00hours, and exporters had to wait outside with their mangoes until morning.

- Exporters from Côte d'Ivoire lend field crates free of charge (it is claimed), whilst Malian exporters charge rent at 25F day.

- For local exporters, the pisteurs rent a pickup with 7 people. For Côte d' Ivoire exporters, pisteurs rent a 10t lorry and travel with 15 harvesters. The pisteurs travel with the fruit to Côte d'Ivoire packing stations.

- It was generally agreed that an association specification for mangoes would be a good idea.

- Exports by sea are 80% of all exports, with 20% by air.

2. Visit to Mango packhouse (Conditioning Station) at Sikasso

A visit was made to the packhouse, built by Mr Tapon; a French businessman whose company is called AOM. Mr Tapon has had financial problems and the Bank of Mali has reclaimed the packhouse ; it may be sold in the future, but at the time of this visit, it's future was unsure.

During the 2000 season, four exporters shared the station facilities, but many difficult administration/management problems arose. Exports were mainly by sea freight.

A large packhouse, some of the natural daylight was blocked (by security covers) during the visit.

- The packhouse building is large (very approximately, 2500m2), with additional pack aging stores (mezzanine level) and very adequate coldstore. The station was purpose built, and is relatively new.

- The station has a reputed capacity of 60 tonnes day, although only 20T were actually packed.

- Israeli conditioning equipment has been installed, with product elevating, examination, brushing and drying areas, followed by grading by weight into padded collecting bins for packing.

- The system is well designed. It has one right angle in the process, but has a one way flow of product.

- A working demonstration of equipment was not seen.

- The precooler and coldstores appear to have large capacities, (rooms are large) easily capable of cooling and storing 60 tons, and probably considerably more.

- The station has several offices, plus packaging stores.

- Lorry loading docks are raised.

- Wooden pallets are built locally.

- The site very much needs cleaning.

- It is doubtful that there is sufficient artificial light; natural daylight is allowed into the station to help work.

- This could cause a problem, especially for night time production when lights will attract insects, and there are no nets in place over exterior openings.

- The site is very large, with adequate parking.

- There are few resources available for packhouse staff (toilet blocks not visited, and there is no restroom or locker room).

3. Meeting with M. Mamadou Diabaet, head of SLACAER, (Service local De L'Appui Conseil de l'Amenagement et de l'Equipement Rural), at Bougouni

Mr Diabaté has been in this post for 11 months. He is an ex. Sikasso, Government official, and his job is to help farmers. He was unable to give very much information about mango production in the area, and had no idea of the number of farmers in his region, or hectares cultivated, other than to say there were very many.

He works with growers of melons, tomatoes, onions and lettuce. Crops are all rain fed, there are no irrigation schemes. He had a 1L tin of Decis (an insecticide, a.i. cypermethrin) available for growers. This had been bought in Abidjan.

4. Visit to Grower in Bougouni, Mr Ballo

This was a good grower, well organised and working with his extended family.

- Mr Ballo is quite elderly, but sprightly.

- The orchard is 75ha in total.

- 48 ha Keitt was grafted 15 years ago, and is in production now. Trees are evenly spaced at 10m x 10m, and the orchard is neat and tidy, with uniform trees.
  27ha Kent, were planted 6 years ago, and will commence fruiting in three year's time.

- Cultivation : No pesticides or fertilisers are applied. The grower harrows the field/shallow cultivates after harvest, by tractor. The tops of trees and lower branches near ground are pruned. The grower is aware of pruning to let light into the canopy for colouration of fruit.

- The major problem is mango fruit fly and Mr Ballo worked on pesticide trials for the control of fruit fly with Jean Francois (CIRAD entomologist working with the CAE Project). He used 64 traps/cages, observed the results/number of flies caught and when appropriate sprayed a 1m2 (fruit free) zone of every other tree with pheromone/ pesticide mix to control the fly. It worked well and Mr Ballo would buy the control system, if it were possible to do so (he was impressed with the results).

- At harvest, one man climbs the tree, cuts and drops fruit to a second man who catches the fruit. If fruit falls to the floor it is not used. For fruit that is too high on the tree for climbers to reach, he has a device with a net which cuts and catches fruit, although this is

not the best method of harvesting. The man on the ground puts the fruit, stem down, to drain latex.

- Export quality fruit is claimed to earn 150CFA/kg, or pisteurs pay 200CFA per 3 pieces.

- Generally, Yields for 75 ha are :

  - 7500 mango trees on 75ha,
  - 500kg per tree export quality mangoes,
  - 350 tons from the farm,
  - Giving a total of 200t export quality.

- Mr Ballo has a sheltered area for mangoes post harvest. The shelter is approximately 8 x 12m with an earth floor and a galvanised metal roof (silver colour), resting on metal supports. The shelter was supplied by a customer/exporter Jean-Marc, who has now returned to France having suffered financial problems.

- Mr Ballo has plastic field crates, grader and a weighing machine for use during the harvesting season. The equipment was locked away under cover during the off-season.

- Mr Ballo grades and packs his own and other's products for exportation.

- He works with anyone who buys. During the 2000 season, he worked with 2 Côte d'Ivoire exporters, 1 from Bamako, and 1 from Sikasso.

- For one exporter, Mr Ballo exported graded, boxed product, and loaded it directly into a refrigerated lorry for export by sea via Abidjan. (The exporter arranged transport, etc.)

- Mr Ballo does not speak French or English.

5. Visit to second grower Mr Diawara

The orchard was not as well managed as that of Mr Ballo. Mr Diawara has 12 ha of mangoes, very widely spaced, uneven trees, with some (new) replanting. Mainly Keitt with some Kent.

Together the two growers had heard of labels on fruit for promotion, and when asked about traceability felt there was no problem with putting one label on each fruit.

Monday 30 October, 2000

1. Visit to SOMEPAC

A meeting was held with Mr Youssouf Coulibaly, Directeur Technique et Commercial.

- SOMEPAC only produces cartons, and does not supply other products – straps, corners, tissue, etc.

- He buys pulp internationally (from USA, S. Africa, Switzerland, and Canada) through intermediaries, getting the best price for the (relatively small) volumes bought.

- The pulp is imported into Dakar and formed into rolls.

- He buys Kraft paper.

- He produces two forms of paper – hard pressed which is more resistant to humidity, but not plastic coated or wax impregnated card. Standard card is used for lighter airfreight boxes.

- Pulp prices have risen recently ; approximately figures for boxes are :

  Price for 5,000 boxes x 5kg cost 425CFA each
  10,000 boxes x 5kg cost 400CFA each
  50,000 boxes x 5kg cost 380CFA each

- Heavyweight boxes cost 15% more than lightweight.

- Once pulp is delivered to Senegal, the delivery of card takes 3 days, or up to 45 delays if a problem develops. There are usually stocks of raw material at Dakar.

- SOMEPAC can produce brown and white boxes, but prefers to supply brown. White costs 4% more.

- Boxes are usually delivered printed with 1 or two colours.

- With 3+colours the costs rise 10%.

- Malian exporters have to pay for boxes prior to production. The CAE Project would have to pay only a 50% deposit with an order, and the balance when the boxes are collected.

- SOMEPAC can provide boxes of any dimensions.

- Given a box, SOMEPAC can copy design/folds, etc.

- They claim to be able to produce 5,000 boxes in three days.

- Box dimensions : 4.5kg box = 35 x 27 x 11cm

- Box dimensions : 5kg box = 40.l5 x 28 x 12cm

- A tour was made of the box producing area. The site needs cleaning, including cleaning up of diesel oil (the forklift trucks appear to use diesel). With its current systems, the packaging supplier could not gain approval with UK multiples as a box supplier.

2. Visit to Maersk Sealand

Maersk has a new DG Mr René Overgaard Jensen. He is ex. Operations Manager of the Maersk depot in Abidjan, and appears to be very knowledgeable about the export of fresh fruit and vegetables. He thought he dealt with 5 containers of Mali exported product last year, but couldn't be sure.

- Maersk only work with reefer containers.

- Temperature controlled containers are easily available.

- Controlled Atmosphere containers are also available, and Mr Overgaard said they had been used for Ivory Coast mangoes.

- Containers could be loaded at Bamako for transport to Abidjan.
- 4 ships per week depart Abidjan :

    - 1 (Thursday ?) to arrive in Rotterdam (9 day journey)
    - 2 go to the Mediterranean Algercerias (Spain), Fosse sur Mer, near Marseilles, (9 days to Fosse).

- 40' high cube containers are the easiest to lease
- Cost of the container from Abidjan to Bamako is 6-700,000 CFA
- Costs of a 40' container Abidjan to Rotterdam is 17,000 French Francs
- Genset fee US$200.00
- A controlled atmosphere unit costs US$1500
- There is a Fuel surcharge of 80 Euro and a currency surcharge of 117 Euro

Other points :

- Maersk are considering organising air cargo at Bamako airport for European destinations, and are looking at air charter for the W. Africa region only.
- They are also considering buying/leasing facilities, including coldstores, at Bamako airport.
- Mr Overgaard had heard that a rich Malian client is investigating the purchase of the AOM Packhouse at Sikasso
- Maersk have contacts who want to buy green beans (airfreight).

Tuesday 31 October 2000

1. Mr Kouyate – OPIB (Office de Permitte d'Irrigate Baguineda)

This was the best organised region visited, figures for production in the area are :
- 15,000 ha in total
- 2,500 ha irrigated
- 8,000 producers

Water is taken from the River Niger, along a 55 year old French built 45km long, irrigation canal. This is a production area for rice, vegetables and fruit trees.

Mr Adama Tall showed us around the area.

The local government support system is well organised and growers advised. 10 good producers each have 1ha of rice grown to certified standards for seed production.

There was quite a lot of grafting of mango trees some 20-30 years ago. Unfortunately they were grafted with Amélie, but growers are changing to grafting more exportable varieties. Mr Adama was greeted well by growers.

Problems have been experienced in the area with bean producers, given seed by exporters, and encouraged to grow the beans that the exporters then failed to buy. There is no local market for green beans, and therefore serious sales problems arose for growers.

- Seasons :

1. Rice is grown from May for September /October Harvest.

2. Rice is grown again Jan, Feb March, April harvest in May :

    - Rice crops are followed by followed by legume harvests from Sept to May, plus tomatoes, cucumbers okra, melon (watermelon) onions and cabbage.
    - The water table between the canal and the River Niger can be manipulated to surface level if necessary. On the other side of the canal the water table is 2 metres down. Mangoes and citrus are planted here.
    - 100 ha of mangoes are grown, owned by approximately 250 growers. The smallest orchards are 0.5ha, maximum 5ha.
    - Varieties Amelie90%
      Kent 6%
      Keitt + others 3% (includes Irwin, Valencia and Zil)
      Varieties are mixed in orchards.
    - Amelia and Julia were decided on in the1970's, and trees of this variety date from then. Newer varieties of mangoes are on younger trees. There has been some successful grafting of export varieties onto 30 year old trees. After around two years fruiting/production starts. It is claimed there are no problems with this type of grafting.
    - It is claimed (as reported in 1999 by Jean-Yves Rey) that Keitt colours well in the area.
    - Mango Fruit Fly is claimed to be only a problem towards the end of the season from May on, as rain begins.
    - Kent has a tough skin and is not widely attacked.
    - Keitt has a thin skin and is more frequently attacked.
    - Amelie is attacked at the end of harvest as it ripens.
    - (It was claimed that in Sikasso the variety Brooks attracts flies, more readily than most varieties, and the increased humidity in Sikasso makes the fly problem worse.)
    - Prices :
      Local market 5 fruits = 200 CFA
      Export 1kg (3-4 fruit) – 150 CFA Fruit size 250 – 600g
    - Yields
      Amelie 10-12t ha

Kent 8-10t ha.

- 15% of the harvest is completely lost because of quality, only 15% of the yield is of export quality, the remaining 70% is local market quality. The main problem is fruit fly.
- No pesticides or other inputs are used because there is no guaranteed market.
- There is no co-op for marketing product, and growers rely on pisteurs.
- There is no central market or packing station.
- Growers are creative, they cut older trees drastically and sell branch wood for firewood, but leaving the trees alive with one or two growing branches. The orchard floor revealed is then used to produce vegetables for the local market.

This was one of four sites of irrigated land ; this one is north or Bamako, others are to the south, east and west.

3. Meeting with M. Boubacar Makanguile, Deguessi Vert

- Deguessi Vert has been in business since 1993, and has a range of business activities including property, car hire. etc.
- He is an exporter of green beans and mangoes (but has not exported mangoes in 2000). He exports to Switzerland and France.
- He exports beans only in Jan and Feb. Other green bean exporters operate from November to the end of Feb. (Currently, these include Maliprimeur and Continental.).
- He exports beans from c. 7 villages, 50/60 small growers/village, in three zones. He provides seed, etc, and production guides. He has a team that collects and buys the beans, which are graded, packed and chilled at TAM facilities at Bamako Airport, or at his own packing station (depending on which is closest to the different sources of production). He has business relationships with growers, but his team carries out most work.
- He generally exports 100t mangoes year, but has no orders for 2001.
- Mangoes : varieties exported are Amélie, Valencia, and Kent, 70 tons year to France. He uses12 people and a lorry to collect the fruit and condition it at the airport or his own station.

<u>Thursday 2nd November, 2000</u>

1. Visit to Maliprimeur

- Maliprimeur export 60-70t of mangoes by air to one client, but that client is now asking for seafreight mangoes.

- Maliprimeur also exports 100t green beans from November to February to two clients.

- Mangoes are bought from 20-30 suppliers (of whom 10 are regular suppliers). The collectors are ladies who are asked to collect the required variety and size. Maliprimeur buy what want from the mangoes collected. The rest are sent to the local market. Ladies are paid after triage of the mangoes.

- The major problems experienced are :

1. Buyers in France are not reliable – they make excuses not to pay.
2. Lack of reliability/agreement with growers and (lady) pisteurs.

A visit was made to Maliprimeur's packing station :

- The site is approximately 70' x 30', an open area between two buildings.
- A canopy is placed over the grading area when it is in use.
- Maliprimeur have a circular grading machine (Tourangelle).
- Product is washed in plastic buckets
- The site has one 8t cold store, and one 1t coldstore. These are positioned in the furthest corner from the loading area.
- Maliprimeur has a refrigerated 8t lorry.

2. Visit to Yaffa & Freres

A meeting was held with Mr Bakary Yaffa, President Director General of Yaffa & Freres.

This exporter had one of the best sites visited – situated by a good road, on the way to the airport and near sites of mango/vegetable production (around Bamako, and a direct road Sikasso).

- The site is c. 120' x 120, with a large 3 storey building (offices/stores). All work is carried out in a corner of the site, under a thatched canopy (thatch replaced at the beginning of the season).
- There is no cold store, but Mr Yaffa rents cold storage at the airport when flights are delayed.
- There is however, no automatic cleaning/weighing equipment, all washing, brushing and grading is done by hand.
- He exports around 100t of mangoes/year by air, exported in 5kg boxes to France.
- Yaffa exports mangoes until September for one customer, even though he may have to buy 5t of product to get 1t of export quality fruit. (The remainder is sent to the local market.)
- Five persons are retained as permanent staff all year. During the major part of the season, Yaffa employs 50 people, and exports 15t per week of mangoes. They have a good young manager in charge of the station.
- In 2000 they exported 12t by boat (as groupage).
- Mr Yaffa is visiting Belgium buyers during November (as in previous years) to discuss orders for 2000.
- Product is sourced as follows :

    - 20% direct from farmers – three farmers from whom he buys mixed grades, at lower prices than pisteurs (25F/kg less) because they are mixed grades. He discusses purchasing with farmers, and then arranges lorries and labour to harvest.

- 80% of product is bought from pisteurs.

- The three growers incl. Mr Ballo, 75ha, (previously visited by the author) plus Mr Diawara 7ha, and Mr Bagayogo, 15ha.
- Mr Yaffa has printed address/contact labels to stick onto his boxes.
- Major problems include the fact that he has to pay 100% in advance for packaging. If he delays purchase, it may mean a shortage, if he buys too soon, then he ties up money too soon.
- Mr Yaffa uses agents in Belgium, (1), Holland (3) and France (5).
- He advises buyers by fax of the Airway bill no., variety and number of boxes in each consignment.
- Size grades :

Amelie	6-12
Kent	Generally 12-14 (has size 5)
Valencia	12-14 (largest available is 8)

3. <u>Meeting with Pisteurs used by Fruitex</u>

A meeting was held with the following personnel :

Mr Amadou Niane	Owner of Fruitex (part time)
Modibo Kanale	Packhouse Manager
Adam Travel	In charge of packing mangoes
Dembo Diakite	Pisteur
Mossadje Traore	Pisteur
Mamine Samaka	Pisteur

Points arising :

- On average each pisteur works with 40 orchards (producers), taking 1 ton per day of mangoes.
- Each pisteur works everyday, if he has the money to buy.
- Pisteurs have to buy all sizes of mangoes that are export quality. It is hard to buy just one or two sizes.
- The major problem is lack of money for reserving crops, eg reserving 1ha of the variety Kent costs 100,000CFA. Farmers respect reservation of a crop if money is paid in advance, but if no money is paid, there can be no firm agreement. Reservations, plus money, have to be made three weeks ahead of harvest. If there is a subsequent natural disaster which damages the fruit, it is the pisteur who loses money.
- Pick ups are rented by the day as needed (25,000CFA/day).
- 4 persons are required every day for harvesting.
- They believe that there are around 200 working pisteurs (mainly women) around Bamako.
- Generally pisteurs work closely with two exporters, but supply others if the main two aren't buying.

- The pisteurs prefers to take orders just one day in advance. If they are made too far in advance it is difficult to get workers and a pick-up organised in advance, and there is a serious danger that the exporter may renege on arrangement.
- None of the exporters works everyday, they may work every day in April and May, but not at other times
- The exporter provides field boxes, which the pisteur has to return, or pay for.
- The first visit to examine the crop is made in February, (eg by motorbike), just before the start of maturity.
- Pisteurs have 'good enough' relationship with growers.
- Harvest is carried out carefully and mangoes stored in shade under trees.
- Visits one orchard per day if possible, but on some occasions it is necessary to visit many.

Friday, 3 November 2000

1. Meeting with the President of Mango Producers, M. Famini Traoré at Selingué

The region around Selingué is marked by a dam built in 1967, which supplies electricity for Mali. The presence of the dam also means that the growers are able to produce rice, as well as maize and other vegetables.

GTZ the German Government Aid agency have an important presence in the region, working with the local population on all areas, including rice production, silviculture, etc.

A meeting was held with the President of the Mango Producers in Selingué. M. Traoré informed us that :

- There are approximately 150 mango producers in Selingué, generally with 4-5 ha of mango, and a maximum of 10ha.
- Varieties of mangoes grown are Kent and Keitt (60%) of crop ; the remainder are mainly Amélie.
- Mango varieties are mixed in the orchards.
- The colour of Kent is generally good.
- There was little understanding of mango production – the control/life cycle of the mango fly for example, or even the damage caused by the fly prior to harvest (although it was noted that flies attacked mangoes on the orchard floor). Little work was carried out in the orchards. For example, growers did not prune trees because of insects in the trees that bite. They do however cultivate under the trees, using horse drawn equipment.
- Buyers, ladies from Bamako, visit the orchards, after the harvest of Amelie, to buy Kent and Keitt.
- The buyers arrive in groups of two or three, in small lorries that carry around 2-2.5 tons.
- The buyers arrive with field crates, and carry out the harvest themselves. The farmers do not help the harvest, the women prefer to work unassisted. The women harvest the fruit carefully, drain the latex, and put the mangoes into the field crates.
- There are approximately 5 groups of ladies; they arrive and leave the same day, and return to harvest again after 2-3 days.

- The ladies buy all qualities of mangoes, not just export quality, and pay the farmers before leaving.
- In total, five to six, 2 - 2.5t lorries of fruit are purchased each week (c.12t per week), over a period on 1 month and 15 days. A total of approximately 70t over the season.
- Prices paid are : 3 mangoes (mixed sizes) are 100CFA.
- The price per kg is 125-130CFA, and exceptionally 135CFA.
- The growers want 150CFA per kg.
- During the 2000 season, representatives of the Pool at Sikasso visited the growers and offered just 90CFA per kg. The offer was refused.
- A visit was made to an orchard belonging to the Association's secretary. This contained a variety of mango which they called Daw Saden, an early, non exportable variety giving fruits of c. 1kg each.

Tuesday 7 November, 2000

1. Visit to SAGA Mali

A visit was made to the offices of SAGA Mali, and a meeting held with Bertrand Fleury de la ruelle, (Co-ordinator of maritime shipments) and his team.

Points arising included :

- Saga have very few sailings of less than 11 days to northern Europe.
- the journey to Abidjan takes 36 – 48 hours.
- the staff and management appeared to have little experience or understanding of good handling of fresh fruits.
- the general manager was unable to give a precise estimation of costs for export via container, because internationally, all costs were in the process of being reviewed. However, it was suggested that a 40' refrigerated container from Bamako to North Europe might be French Francs 50-53,000.

ANNEX IV

Recommendations for packhouse design to meet the requirements of UK multiple customers

UK multiple supermarkets are the most demanding of world customers, particularly in terms of the level of service and packhouse hygiene that they expect from suppliers.

The recommendations given below are outline suggestions for the construction of a packhouse, designed to meet the specifications of UK multiple supermarkets.

The recommendations are intended to give an indication of the level of sophistication required. The basic plan applies to all packhouses, including those which are very small, (eg 100m2), and those which are large.

If considerable sums are to be invested in building a packhouse, it is strongly recommended that specific consultant advice is taken at the planning stage.

a. Site

The site should be level, well drained, with good access to areas of production and metalled roads for transport to airports/ seaports. The site should be big enough for the reversing/turning circles of the largest vehicles to be used, including, where relevant, 40' containers.

The floor of the packhouse should be completely level ; there should be no steps and no slopes into, or within, the packhouse/packaging areas/coldstores.

In order to have smooth, safe and unimpeded movement of pallets of mangoes (using pallet movers or forklift trucks), between the packhouse and the external site, the site should be completely level (or have only a very slight gradient for drainage purposes).

The only exception to the level site should be the outloading bay(s). Sophisticated packing stations have a sunken loading bay. Lorries/containers should be able to back down a long gentle slope, until the back of the vehicle almost touches the wall surrounding the packhouse exit[7]. The length and depth of the slope is designed so that at the point at which the lorry almost touches the packhouse wall, the floor of the lorry/container is in line with, and almost touching the floor of the packhouse. The depth of the sunken loading bay should equal the height of a lorry/container floor from ground level, (when the container is on the back of a trailer). a canopy over the exit will protect product from rain/sun when outloading.

An hydraulic or portable metal bridge can then be laid across the gap between the lorry and the packhouse floor, allowing a forklift truck/pallet mover to move between the coldstore and the interior of the lorry.

If outloading to smaller vehicles is anticipated, an exit from the packhouse to a level site should be provided, so that product can be moved by forklift.

[7] Guard rails should be installed vertically either side of the packhouse door to prevent lorries accidentally hitting/damaging packhouse walls.

Adequate floor drains should be installed in the packhouse to allow water to be drained away as necessary.

Externally, good drainage, including guttering on roofs should be installed to drain away any rainwater. The vehicle washing area should be away from the packhouse, in an area fitted with drains, ideally with a water collection/treatment facility, to prevent diesel oils etc being washed into the surrounding environment.

b. Packhouse Layout

A relatively simple packhouse design should include :

- Goods arrival area
- Mango sorting, washing and grading area/equipment
- Goods packing area
- Pre-cooler and cold storage areas
- Packaging stores with internal entrances into the packhouse and their own external entrances (so that packaging arriving at the station can be placed directly into packaging stores, without passing through the packhouse sorting, washing and grading areas)
- Locker rooms for staff, and toilets with handwash facilities
- There should be an anteroom where staff wash hands and put on clean overalls, prior to entering the packing station
- Office areas adjoining the packhouse, but with their own separate entrance from the outside of the building
    - Storage room, with water source, for cleaning materials

There are some very simple, basic guidelines to the design of an efficient packhouse. These include:

- Product should 'flow' along a 'one way' system. i.e. it should pass from one process to another in a smooth, continuous line.

- This does not have to be a straight line (although it often is). But it is important that the mango processing line does not pass through other processes in the packhouse (e.g. box making), and that it does not move backward, or cross its own pathway.

- It is particularly important that graded or packed product, does not re-enter 'dirty areas' – eg goods reception/washing areas, where contamination with water, or soil from field boxes may damage the appearance of the product/final packaging.

- Ideally, 'dirty' areas (goods inwards areas, with soil contaminated field boxes etc), should be physically separated from 'clean' areas, (cleaned product, new cartons etc.) by a purpose built wall. Product arriving in the goods inward area is removed from field crates, and passed through openings in the dividing wall – e.g. on a conveyor belt or rollers to the production area. Dirty field crates should never be placed near clean mangoes, or clean packaging.

- Graded, packed product should enter into cold stores directly from packing areas, but exit from the cold store directly to the outside loading bay.

- It is important not to back vehicles into open goods loading/ unloading areas, because of the dangers to personnel and product caused by vehicle exhaust emissions.

- Packaging storage/box formation areas should be to the side of the packing area.

- Where pallets are to be used, doorways must be wide and tall enough to allow easy movement of loaded pallets. The minimum suggested width is 1.5 times the width of the pallets used, although 2.5 – 3 metres may be advisable, with a height of c. 3.6 metres.

- Ideally, personnel doors should be separate from those used by forklift trucks, although in a small packhouse this may not be possible (e.g. through lack of space, additional costs etc.).

- Aisleways must be wide enough to allow movement of loaded pallets including turning circles of c. 2.5m-3m.

- Personnel access to electrical/mechanical/generator plant rooms must be to/from external areas - not from within the packhouse (because of the risk of personnel carrying oil/diesel etc from the plant room into the food area, and contaminating food, boxes, work surfaces etc.).

If costs permit, a staff rest room could be built.

c. Packhouse Building Materials

i. Option 1

White, plastic-coated steel panels (generally 4m high). Installing windows will be an additional cost, and will involve cutting away sections of the panels after the building is constructed. An alternative to windows would be to install high levels of artificial lighting, and air-conditioning.

These panels are easily available for purchase in the UK and Holland, but may be too expensive for Malian exporters.

ii. Option 2

Local construction materials, e.g. bricks/breezeblocks could be used, but there should be no exposed or painted wood. All nails/ screwheads/bolts should be covered/hidden. The interior of the packhouse, (packaging stores, goods inward and packing/grading areas) should not be plastered. The walls should be sealed and a good, food quality, white washable paint applied to all walls.

d. Windows

Most UK supermarket standards exclude the use of glass in a packhouse. For this reason, windows are not generally incorporated into new packhouse buildings. However, the use of windows in a packhouse built of local materials in a hot climate has advantages, saving:

- the cost of bricks/blocks
- the cost of generating light
- the cost of cooling, if netted windows can be opened

UK multiple approval (at the current time) could be gained by :

i. Using plastic or polycarbonate sheet in the windows (not glass)
ii. Not using glass or polycarbonate, but screening all openings with neatly/firmly fixed, intact (unbroken) insect netting.
iii. Ensuring window openings are placed at a reasonable height, say 1.4m from the floor, and not at waist high level.

e. Cold Stores

Because of the problems associated with insulation and condensation in coldstores, by far the best construction materials to use are insulated steel panels with a white plastic, washable, food safe coating, and these are recommended for the cold stores.

It is important to have a drainage system in the floor of the cold store. All storage rooms – walls, ducts etc. will need to be cleaned periodically. For hygiene purposes (disease/mould control), a sodium hypochlorite solution is the best cleaning material, but will require good drainage.

f. Floors

Concrete floors are recommended for all areas. Insulated concrete or metal floors in the cold stores can help reduce coldstore running costs. In addition, insulation should be used if the site has a high water table (if the coldstore freezes ground water it could create problems).

The concrete should be able to withstand heavy loads, particularly in the precooler and cold storage areas. All concrete surfaces should be coated with a food safe industrial sealant

Good drainage should be fitted into all areas of the packhouse, particularly the ‘dirty’ ‘goods inward’ area. Good drainage will allow the floor to be washed when necessary (which, if large volumes of product arrive daily, could mean washing the goods inward area floor once or twice per day).

‘Gutter’ drains (long, narrow drains running along the surface of the floor) are useful. These should be ‘half round’ or U-shaped in section, and have removable covers and traps for solids, adequate for accessible cleaning. It is essential however that these are well made, and that covers are both strong and ‘flush’ with the floor. Covers of any drains above or below the surface of the floor may result in damage to forklifts/pallet movers. In the event

that well constructed gutter drain covers cannot be supplied, adequate numbers of small, round covered drains should be used.

Ideally, dirty and clean area drainage systems should be separate ; it is important not to drain water from 'dirty' areas into clean areas.

g. Ceilings

Cold stores should be fitted with insulated ceilings (panels as walls above).

Other ceilings may not be necessary, provided roof spaces are tidy/clean/well maintained, and have smooth, impenetrable surfaces, eg metal structures (not wood).

h. Roof

Exposed wood should not be used (if roofs are formed from wood, then non wooden ceilings must be fitted.) If metal roof supports are used, then ceilings need not be fitted. However, minimal overhead structures should be used, and roof spaces must be easy to keep tidy and clean. Visible heavy duty bolts on metal structures are acceptable. Any ventilation spaces, including those under eaves, should be insect and bird proof to prevent insects and birds entering the packhouse. Strong, intact, net/mesh screening should be used. Flies will invade a fruit packhouse in swarms, if they can obtain access, causing hygiene problems and making working conditions unpleasant.

i. Doorways

Pedestrian doorways should be normal industrial widths. Entrances for forklift trucks and pallet movers should be wider, say 2.5-3m wide, and 3.6m high.

Personnel doors should close, and any forklift doors which remain open for any length of time will have to be fitted with heavy duty polythene strips (to keep insects out), in order to meet supermarket standards.

Single sliding doors on cold stores are easier to insulate than double doors and will suffice, particularly if polythene strip curtains are used.

j. Additional Points

- UK multiples specify that joints between walls and floors should be curved (concave) and not right angles, to ensure easy and thorough cleaning.

  i.e. Required joint shape) WALL / floor Incorrect joint ⌋ WALL / floor

- Lighting must be adequate to give high light levels, particularly over grading lines. All glass light fittings must be fully covered or sealed with unbreakable (plastic) covers to retain all glass in the event of any breakage (and thus eliminate the risk of glass from light fittings contaminating food/produce).

- In addition to ensuring that the packhouse and associated buildings are protected from insects and birds, it is important that vermin/rats and domestic animals are prevented from entering all areas of the packhouse.

- A QC room/area should be available. It should be clean, white walled, and have a water source and sink for washing equipment.

- Water used on the site should be suitable for the purpose intended, i.e. potable water for staff, clean water for washing**.** Water used for washing mangoes must be potable.

- A cleaning materials store will be important. It must have a sink and water source.

- There should be no diesel-operated equipment inside the packhouse area. Forklifts should be electric or gas operated.

- Tables and other equipment used should, ideally, be made of stainless steel. If plastic coated tops (e.g. Formica) are used, they must be intact, with no loose particles, breakages etc. They must be rust free.

This information is for guidance only. In practice, in order to supply a UK multiple, a considerable number of hygiene systems will first need to be put in place, together with administration of detailed records to demonstrate that hygiene systems are followed at all times.

Information about hygiene requirements are readily available from any UK importer, who feels an exporter is sufficiently well organised to be able supply the UK multiple market.